Journal of the Royal Society of Arts

NO. 5054 JANUARY 1961 VOL. CIX

FORTHCOMING MEETINGS

FRIDAY, 30TH DECEMBER, at **2.30 p.m.** JUVENILE LECTURE. '*The Legend of the Phoenix*', by Maurice Burton, D.Sc., lately of the Natural History Museum. (Special tickets are required for this lecture.)

WEDNESDAY, 4TH JANUARY, at **2.30 p.m.** JUVENILE LECTURE. '*Railways in Our Time*', by C. Hamilton Ellis. (Special tickets are required for this lecture.)

THURSDAY, 5TH JANUARY, at **6.45 p.m.** SPECIAL MEETING. '*Larger Than Life*', by A. B. Read, A.R.C.A., F.S.I.A., Past Master, Faculty of Royal Designers for Industry. Oswald P. Milne, F.R.I.B.A., J.P., Chairman of Council of the Society, in the Chair. (The Oration will be preceded by a number of presentations. See December *Journal*, p. 3.)

FRIDAY, 6TH JANUARY, at **6.30 p.m.** FILM EVENING. (The programme will include '*Guiseppina*', '*Where Mountains Float*', '*The Travel Game*'. For full details see December *Journal*, p. 4.)

WEDNESDAY, 11TH JANUARY, at **6 p.m.** '*Ergonomics—Fitting the Job to the Worker*', by C. B. Frisby, Ph.D., Director, National Institute of Industrial Psychology. The Right Honble. the Earl of Halsbury, F.R.I.C., F.Inst.P., in the Chair.

THURSDAY, 12TH JANUARY, at **2.30 p.m.** COMMONWEALTH SECTION. '*Photography and Exploration in the Himalayas*', by Captain John Noel, Photographer to the Royal Geographical Society's pioneer Mount Everest Expeditions. Sir Alwyne Ogden, K.B.E., C.M.G., in the Chair. (This paper—which will be illustrated by lantern slides in colour—has been arranged particularly for younger people (aged 15 and upwards), on whose behalf Fellows are invited to apply for tickets. Tea will be served in the Library *after* the meeting.)

WEDNESDAY, 18TH JANUARY, at **2.30 p.m.** FRED COOK MEMORIAL LECTURE. '*The Restoration Portrait*', by Oliver N. Millar, M.V.O., F.S.A., Deputy Surveyor of the Queen's Pictures. Sir Harold Wernher, Bt., G.C.V.O., T.D., D.L., a Vice-President of the Society, in the Chair. (The Lecture will be illustrated by lantern slides.)

MONDAY, 23RD JANUARY, at **6 p.m.** The first of three CANTOR LECTURES on '*The Chemical and Plastics Industries*', by James Taylor, M.B.E., Ph.D., D.Sc., F.R.I.C., a Director of Imperial Chemical Industries Ltd. Stanley Gooding, M.A., M.Sc., M.D., J.P., a Member of Council of the Society, in the Chair. (See syllabus on p. 72)

WEDNESDAY, 25TH JANUARY, at **6 p.m.** ALFRED BOSSOM LECTURE. '*Architecture in Transport*', by F. F. C. Curtis, Dr. Ing., A.R.I.B.A., Architect to the British Transport Commission. The Right Honble. Lord Bossom, LL.D., F.R.I.B.A., a Vice-President of the Society, in the Chair.

MONDAY, 30TH JANUARY, at **6 p.m.** The second of three CANTOR LECTURES on '*The Chemical and Plastics Industries*', by Dr. James Taylor. Sir Robert Robinson, O.M., Past President of the Royal Society, in the Chair.

WEDNESDAY, 1ST FEBRUARY, at **2.30 p.m.** '*Wall Paper and its History*', by E. A. Entwisle, a Director, Wall Paper Manufacturers Ltd. Ivan C. Sanderson, Chairman, Arthur Sanderson & Sons Ltd., in the Chair.

FRIDAY, 3RD FEBRUARY, at **7.30 p.m.** FILM EVENING. (See programme on p. 73.)

MONDAY, 6TH FEBRUARY, at **6 p.m.** The last of three CANTOR LECTURES on '*The Chemical and Plastics Industries*', by Dr. James Taylor.

WEDNESDAY, 8TH FEBRUARY, at **2.30 p.m.** '*The Timber Industry*', by Rodney Perry, Chairman, Timber Development Association.

WEDNESDAY, 15TH FEBRUARY, at **2.30 p.m.** '*The Influence of the Festival of Britain on Design To-day*', by Sir Gerald Barry. Professor Robert Y. Goodden, C.B.E., A.R.I.B.A., Master, Faculty of Royal Designers for Industry, in the Chair.

WEDNESDAY, 22ND FEBRUARY, at **6 p.m.** '*Geography and the Business World To-day*', by the Right Honble. Lord Nathan, P.C., T.D., F.B.A., President, Royal Geographical Society, and a Member of Council, Royal Society of Arts. Oswald P. Milne, F.R.I.B.A., J.P., Chairman of Council of the Society, in the Chair.

WEDNESDAY, 1ST MARCH, at **2.30 p.m.** FIRST EDMUND RICH MEMORIAL LECTURE. '*Youth Welfare in the Pattern of Education*', by W. F. Houghton, M.A., Education Officer, London County Council. Sir Griffith Williams, K.B.E., C.B., in the Chair.

Fellows are entitled to attend any of the Society's meetings without tickets (except where otherwise stated), and may also bring two guests. When they cannot accompany their guests, Fellows may give them special passes, books of which can be obtained on application to the Secretary.

Official representatives of Companies in association with the Society may also attend, with one guest.

SYLLABUS OF CANTOR LECTURES ON 'THE CHEMICAL AND PLASTICS INDUSTRIES'

LECTURE I. Monday, 23rd January. *Towards a Philosophy of the Modern Chemical Industry:* Pre-scientific and scientific chemical industry; what the industry comprises; the emergence in the nineteenth century of the scientifically based inorganic and organic chemical industries; the modern petrochemical and plastics industries and their relationship to quantitative science.

LECTURE II. Monday, 30th January. *The Springs of Progress:* Development of the modern large-scale scientifically based chemical industry during the present century; case histories of I.C.I. and The Royal Dutch/Shell Groups; the widening rôle of the scientist in all the activities of the industry.

LECTURE III. Monday, 6th February. *The Modern Chemical Industry in Great Britain:* The composition of the modern industry and the part it plays in the national economy; statistics; the future of the industry.

FILM EVENINGS

Full details of the films to be shown at 6.30 p.m. on 6th January were given in the December *Journal*, and the programme is briefly repeated on p. 71 of the present issue.

The third Film Evening of the Session will be held on Friday, 3rd February, at 7.30 p.m., when the following two films will be screened:

This is the B.B.C.

Pembrokeshire, my County

This is the B.B.C. (68 minutes) gives an impression of a typical day in the life of the British Broadcasting Corporation. Beginning its vigil at midnight, it moves back and forth across the country observing both unexpected and routine events, and the dramatic and complex ingredients which make up sound and television broadcasting. It concludes with a short colour sequence dealing with colour television.

Pembrokeshire, my County (27 minutes), which is in colour, was made by the Esso Film Unit. The film is a record of human and animal (especially bird) life against a Pembrokeshire background.

Tickets of admission are not required for this occasion and Fellows are entitled to introduce two guests. Light refreshments will be served in the Library after the performance.

PRESENTATION OF THE ALBERT MEDAL

At Buckingham Palace on 22nd November, the Duke of Edinburgh, President of the Society, presented the Albert Medal for 1960 to Sir Frederick Handley Page. It will be remembered that the medal was awarded to Sir Frederick 'for his leadership in the design and manufacture of aircraft'.

In making the presentation, His Royal Highness spoke of Sir Frederick's seniority of leadership and achievement in the aircraft industry, and referred also to his interest in technical education, as evidenced particularly by his tenure of office as Chairman of the City and Guilds of London Institute—a body with which the Royal Society of Arts has had the friendliest relations since its foundation. Sir Frederick in reply expressed his gratification at the honour done to him by the award of the medal, and at receiving it from the hands of the Duke of Edinburgh.

The following present and former Members of Council attended the ceremony of presentation: Mr. Oswald P. Milne (Chairman); Mrs. Mary Adams; Lord Bossom; the Honble. G. C. H. Chubb; Lord Conesford; Mr. R. E. Dangerfield; Sir George Edwards; Mr. Geoffrey de Freitas; Mr. Peter Le Neve Foster; Mr. John Gloag; Sir Ernest Goodale; Professor R. Y. Goodden; Dr. Stanley E. F. Gooding; Mr. Milner Gray; Dr. R. W. Holland; Mr. J. C. Jones; Mr. Edgar E. Lawley; Sir Harry Lindsay; Lord Nathan; Mr. Paul Reilly; Sir Gilbert Rennie; Sir Philip Southwell; Mr. C. M. Vignoles; Mr. H. A. Warren; Sir Harold Wernher; Sir Griffith Williams, and Miss Anna Zinkeisen; with Dr. K. W. Luckhurst (Secretary) and Mr. G. E. Mercer (Deputy Secretary).

SECOND ANNUAL RECEPTION

It is the Council's intention to hold a second Annual Reception, on a date still to be arranged in either March or April, 1961. The day is unlikely to be settled before this *Journal* goes to press, but it is hoped to include a separately printed slip bearing a definite announcement within the pages of this issue. In any case Fellows are asked to apply for tickets as soon as notification of the date is given.

Full details of the evening's arrangements will certainly be announced in the next issue of the *Journal*, but meanwhile Fellows may wish to know that the entertainments will include a recital of music and a film show, and that the cost of tickets will be 30*s.* each. No Fellow may apply for more than one ticket in addition to his own—two in all.

DINNER IN MANCHESTER

An informal dinner for Fellows will be held at the Midland Hotel (Derby Suite), Manchester, on Tuesday, 24th January, 1961, at 6.30 for 7 p.m., when Mr. Oswald P. Milne, the Chairman of the Council, will discuss with those present a proposal to start local activities in the north-western area of the country. Fellows in the area have already been informed by correspondence, but any Fellow who has failed to receive a notice by post and would care to attend should notify the Secretary at Headquarters.

COUNCIL DINNER

The Council of the Society gave a dinner party at the Society's House on 24th November. Mr. Oswald P. Milne, Chairman of Council, presided, and the guest of honour was Sir Frederick Hooper, Managing Director of Schweppes Ltd. Most of the other guests were representatives of companies in association with the Society.

USE OF THE LETTERS 'F.R.S.A.'

Instances are occasionally brought to notice of the Society's designating letters being improperly used. Fellows are therefore reminded of the Bye-Law on this matter, the appropriate section of which is repeated below:

> Any Member of the Society . . . is authorized to use the style or title of 'Fellow of the Royal Society of Arts' or to use after his name the initials 'F.R.S.A.' to indicate such membership, *but not for business or advertising purposes*. . . .

The words to which special attention is drawn are printed in italics.

INDUSTRIAL ART BURSARIES EXHIBITION

The exhibition of winning and commended designs submitted in the 1959 Industrial Art Bursaries Competition will be on view at the Sheffield College of Art, Brincliffe, Psalter Lane, Sheffield 11, from 16th January to 4th February, 1961.

ERRATUM

Mr. W. L. S. Harrison, General Secretary of the Mercantile Marine Service Association, has written to say that he was misquoted in the transcript of the discussion which followed Captain Wakeford's paper on 'The Training of Officers for the Merchant Navy'. The reference is to the December *Journal*, p. 29, penultimate paragraph, line 9: Mr. Harrison in fact spoke of 'the policy of introducing sandwich courses and *maintaining* [not "weakening"] the link between pre-sea training ships and the potential ship's officer. . .'.

MEETING OF COUNCIL

A meeting of Council was held on Monday, 12th December. Present: Mr. Oswald P. Milne (in the Chair); Mrs. Mary Adams; Sir Hilary Blood; the Honble. G. C. H. Chubb; Mr. R. E. Dangerfield; Sir George Edwards; Mr. John Gloag; Sir Ernest Goodale; Dr. Stanley Gooding; Mr. Milner Gray; Dr. R. W. Holland; Mr. Edgar Lawley; Lord Nathan; Mr. Paul Reilly; Professor S. Tolansky; Mr. G. E. Tonge; Mr. C. M. Vignoles; Mr. Hugh A. Warren, and Sir Harold Wernher; with Dr. K. W. Luckhurst (Secretary); Mr. G. E. Mercer (Deputy Secretary), and Mr. J. S. Skidmore (Assistant Secretary).

ELECTIONS

The following candidates were duly elected Fellows of the Society:

Brott, Professor Alexander, Mus.Doc., Montreal, P.Q., Canada.
Carr, Geoffrey Thomas, Middlesbrough, Yorks.
Caruana-Montaldo, Joseph, L.P., A.C.I.I., Valletta, Malta.
Caruana-Montaldo, Oscar, B.Arch., A. & C.E., L.P., Valletta, Malta.
Caruana-Montaldo, Walter, B.Arch., A. & C.E., L.P., Valletta, Malta.
Downey, Captain James Albert, Ramsgate, Kent.
Durden, Peter Douglas, N.D.D., L.S.I.A., Birmingham.
Evans, Cyril Bernard, Newport, Mon.
Ewence, Hedley Robert, London.
Farina, G. B. Pinin, Hon.R.D.I., Torino, Italy.
Fidler, Alwyn Gwilym Sheppard, M.A., B.Arch., F.R.I.B.A., Birmingham.
Hagerty, Eric Seán, N.D.D., A.T.D., Holyhead, Anglesey.
Hall, Eric, E.R.D., p.t.s.c., B.Sc.(Econ.), Leyburn, Yorks.
Hastings, Robert, London.
Jury, Archibald George, F.R.I.B.A., F.R.I.A.S., Glasgow.
Kelly, Anthony David Allen, B.Sc., F.R.I.C.S., London.
Lawrie, William Burton, M.B.E., M.Sc., Croydon, Surrey.
Leggatt, Raymond Alexander, London.
McClure, Peter George, Cowes, Isle of Wight.
Nuttall, Miss Beris Muriel, Huddersfield, Yorks.
Pagulatos, Mrs. Angela Carol, N.D.D., Des.R.C.A., London.
Pomfret, Walter Roydon, A.T.I., Manchester.
Rolfe, George Spencer, Longfield, Kent.
Rowley, Francis John Bernard, N.D.D., London.

Rowson, Ewart Alexander, Holyhead, Anglesey.
Sayers, Leslie Watson, M.A., London.
Sharps, John Geoffrey, M.A., Northwich, Cheshire.
Short, Royston Guy, Yeovil, Somerset.
Storrs, Martin Basil, London.
Ward, Philip, North Harrow, Middx.
Whatley, Arthur, Middlesbrough, Yorks.
Winter, Harold Edward, Cleveland, Ohio, U.S.A.

The following candidate (an Examinations Silver Medallist) was duly elected an Associate of the Society:

Dillow, Ian Anthony Patmore, Portsmouth, Hants.

The following was duly admitted as an Institution in Union with the Society:

The University Library, Newcastle-upon-Tyne.

THE EDUCATIONAL USES OF TELEVISION

It was agreed to notify the Committee on Broadcasting (the Pilkington Committee) of the Society's intention to submit representations regarding the educational uses of television.

OTHER BUSINESS

A quantity of financial and other business was transacted.

THE COAL MINING SITUATION TO-DAY

The Cadman Memorial Lecture by

F. G. GLOSSOP, O.B.E.,

Production Director, North-Western Division, National Coal Board, delivered to the Society on Wednesday, 16th November, 1960, with R. G. Baker, C.B.E., President, Institution of Mining Engineers, in the Chair

THE CHAIRMAN: It is my privilege to introduce to you this evening our lecturer on the occasion of this Cadman Memorial Lecture, and I do so with great pleasure for personal reasons in that I have known Mr. Glossop for a long, long time: whilst he was senior to me at the Mining Department of Sheffield University and had just left before I entered, he kept in touch with us through the Sheffield University Mining Society until, in due course, we juniors emerged as supposedly qualified engineers. Although I have never had the privilege of working with him we have always kept in touch. Thus I have pleasure in introducing Mr. Glossop to you both for quite personal reasons and also because of the great amount of work he has done for the Institution of Mining Engineers.

I am not going to go through the whole of his history because it is, I think, known to many of you, but there are some here who will not know him so well; and I will mention something to illustrate to you that he is a man who has been all his working life in the industry, in the closest possible touch with mining matters and the development of them during all these years. He was trained at Glapwell and Langwith Collieries and later became the Manager of Langwith. He then moved to Yorkshire and was Manager at Rossington, later becoming agent of both Rossington and Dinnington and, later still, General Manager of Maltby, Denaby and Cadeby Collieries. Vesting date took him away from us in Yorkshire: he went over the Pennines to be an Area General Manager, and shortly thereafter became Production Director of the North-Western Division, where he has made a very big mark in the progress and development of their collieries.

He was awarded the O.B.E. in the recent Honours List and we all felt it was very much deserved.

The following lecture, which was illustrated with lantern slides, was then delivered.

THE LECTURE

May I say how greatly I appreciate the honour you have done me in inviting me to give this paper to-day. Not only is it a distinction any mining engineer would be proud to have but it gives me the chance to repay in some slight measure a debt owing to the late Lord Cadman since the time, nearly 40 years ago, when he became the Honorary President of a local Mining Society of which I was the Secretary. Then we knew it was a fine thing to have Professor Cadman as our President; now I realize how great was his love for his profession and how kind

he was to join us at our functions which perforce were always held on a Saturday evening.

Ever since the Industrial Revolution our profession has been advanced by men of achievement who have shown the way to their fellows and bequeathed fresh knowledge to their successors. Lord Cadman was one of them. I am glad that we are commemorating his name again to-day.

When I was considering what to say, it occurred to me that it would be useful and interesting to give a resumé of the present situation in the mining industry and what the mining engineer is trying to do to meet it. I can highlight only a few points because the whole field cannot be covered in one lecture.

While the mining engineering side is of prime importance, it must be remembered that, despite mechanization and other improvements, labour costs are still about 60 per cent of the total, which means to say that manpower and labour distribution and performance have a very great influence upon our overall results. And, of course, finally and conclusively there is the customer.

THE PRESENT SITUATION

Throughout Western Europe there are large stocks of coal surplus to present requirements. Of course, 'coal' is a generic term: what is excellent for the electricity generating industry, is anathema to the domestic market. Hence the current anomaly where overall we are producing more of some sizes than is required yet not enough of some others. Again, it is common knowledge that the National Coal Board, having critically examined all the possibilities, decided to stock rather than go on to short time in 1958-9 and that for two years recruitment has been restricted so that natural wastage would cause such a run down of manpower that stocking would cease in 1960 and lifting from ground stocks begin in 1961.

In its main aim this has been successful. A number of marginal pits, where output was expensive, have been closed and the efficiency of the industry in output per manshift has risen rapidly as the following table shows:

TABLE I

Year	*Output per Manshift*	*Total Output (N.C.B. only)*
	tons	*million tons*
1955	1·23	210·260
1956	1·23	209·925
1957	1·23	210·059
1958	1·26	201·475
1959	1·33	195·275
1960 (1st half)	1·399	96·616

On the other hand, the wastage of manpower has been unequal. The numbers

leaving in the Northern fields have been low whereas in the Midlands, the most productive field in the country, wastage has been high.

It may be of interest if we consider the distribution of labour at a colliery. Taking the country as a whole, the proportion of shifts spent at various tasks is roughly as follows:

	%	
Face	37	(excluding officials)
Elsewhere Underground	43	(36·5% men, 6·5% officials)
Surface	20	
Total	100	

The primary function of men on the 'Surface' and 'Elsewhere Underground' is to serve the coalface so that production can be a regular, continuing and safe process; consequently for each mine at a given output there must be a certain number of men engaged in these two branches even when the number of facemen is minimal. In other words, after wastage has proceeded so far at any particular mine the next man to leave from either 'Surface' or 'Elsewhere Underground' must be replaced by one from the 'Face'. Up to this point the efficiency (output per manshift) rises, partly due to the concentration of operations and partly to the incentive effect of restriction of output on the men. Once this stage has been reached, however, the output begins to fall more rapidly than manpower and, conversely, costs rise very steeply indeed. This latter point is deeply significant and is worth consideration.

Deep mines such as are worked in Britain are not flexible instruments. Maximum output is determined by the capacity of the shafts and winding equipment. The Manager is normally expected to maintain maximum output and, to do this, must plan for underground development to be carried out consistently ahead of requirements. This is not always easy because in coal mines the strata tend to close up, so if the development is too far ahead it may have to be done over again in conditions which have deteriorated.

Now the total cost contains a large proportion of fixed charges which are independent of the output, hence any fall in tonnage will have a more than proportional effect. This is illustrated by the following table relating to a large successful mine:

TABLE II

Output % of Maximum	*Fixed Charges*	*Variable Charges*	*Fixed as % of Variable Charges*
%	%	%	%
100	59	41	142
75	65	35	184
50	73	27	266

For a smaller and less successful mine the corresponding figures are:

TABLE III

Output % of Maximum	*Fixed Charges*	*Variable Charges*	*Fixed as % of Variable Charges*
%	%	%	%
100	62	38	164
75	69	31	216
50	76	24	318

It is this fact which is so important when reductions of output have to be considered. Indeed, sometimes it pays to keep open a losing colliery because of the effect its tonnage has upon the output, hence the cost, of an Area.

As to demand, it is difficult for most major consumers to predict their requirements for many years ahead. To take one case of outstanding importance, the electricity generating industry. In 1947 the demand was for low ash 'smalls' and washeries were built to cater for this, but to-day this is the very quality they do not want: fairly consistent high-ash dry 'smalls' are now required and, again, plants are being built to suit, some completed only a few years ago having to be modified. The fact that this change has come about through great improvements in generating efficiency is to be warmly welcomed in the national interest but it does demonstrate that forecasting is still far from an exact science and hence that the overall output required of the industry is hard to predict.

WAYS AND MEANS OF MEETING THE SITUATION

Former speakers on other occasions have shown the need for higher face output per manshift if the industry is to hold its own, and their remarks are just as true to-day. We have already seen what improvement has been made. Let us see how it has come about.

1. *Underground*

(*a*) *At the Coalface*

On orthodox faces the coal is undercut, blasted and loaded by hand on to the conveyor, after which the conveyor is moved forward ready for the next day, the packs are built and the back props withdrawn. Such faces still produce about 60 per cent of the total output, so what happens on them is significant.

On a typical face 200 yards long in a 4 ft. thick seam, undercut 5 ft., the men will be distributed something like this:

TABLE IV

Item	*Number of Facemen*	%
Undercutting	6	7·5
Drilling and blasting ...	6	7·5
Filling	30	37·5
Moving conveyor	4	5·0
Packing and drawing off ...	19	23·5
Ripping	10	12·5
Steel checkers, etc. ...	5	6·5
Total	80	100·0
Total output per day—400 tons run-of-mine.		

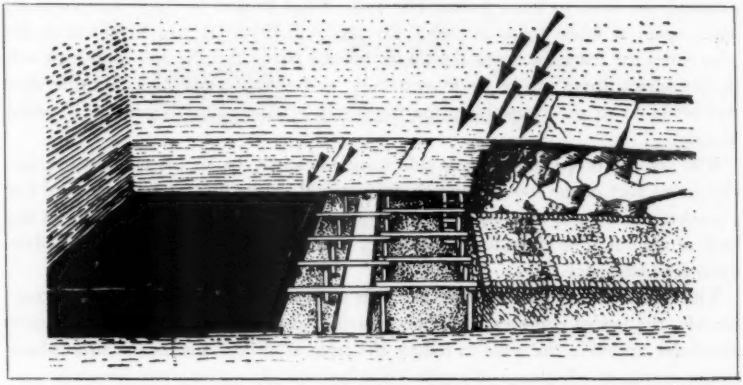


FIGURE 1. *Roof conditions above a longwall face*

It will be seen that the actual fillers constitute little more than a third of the facemen, and when it is recollected that the facemen themselves are only about 37 per cent of the total labour force in the industry the importance of improving their ratio is easily seen. It is recognized that it is unlikely that a greater tonnage will be loaded per filler; that is one of the benefits to be conferred by power loading. Nor can the numbers engaged on undercutting, drilling, moving conveyors or ripping be much reduced in customary methods of work.

One aid to efficiency, however, lies in the treatment of the extracted area called the 'gob' or 'waste'.

It should be realized that the props set at the face only hold the nether roof; they are quite unable to support the strata above. If the props carry a load of 20 tons each and are set 4 ft. apart each way the supported weight per square foot is $1\frac{1}{4}$ tons, whereas for a working 1,500 ft. deep, which is about the average depth in this country, the total load per square foot would be about 100 tons and per prop no less than 1,600 tons. If our working face is 600 ft. long and we limit the supported width to 12 ft., the total load reaches the huge figure of 720,000 tons.

Obviously the roof strata must support themselves to a large extent, and it is the miner's job to see that they do so. This can be done by keeping open only the narrowest practicable space for working and providing behind that a cushion on which the subsiding roof can settle. Such a cushion can be made of rocks from the strata built to form wide, dry stone walls or packs, spaced at intervals along the waste, say walls 4 yards wide with spaces of 8 yards to 10 yards. Or the space can be packed solid with small debris packed by hand or, better, projected into the cavity by compressed air after the fashion of a continuous pea shooter. Solid packing is effective but being costly is normally reserved for special cases.

As Table IV shows, packing occupies 23·5 per cent of the facemen, so in recent years there has grown up a practice of encouraging the roof in the waste to collapse so freely that it actually fills the void as thoroughly as hand packing does, thereby avoiding the need to build packs. The stone when broken occupies half as much space again as when solid, so that if the roof will break up to a height of about 1·75 times the seam thickness the upper broken layers and the still solid rock will be in contact, there can be no more falling, and as the upper strata subside they will settle on to and consolidate the fragments beneath. Such a process is called 'caving'.

The row of props on the gob side must obviously be so robust that the unsupported part of the roof behind them snaps off short. Fortunately, the roof has a tendency to do this because undercutting creates a plane of weakness in it at the back of the cut. The extending adoption of caving has had a most beneficial effect upon face efficiency.

There are two other developments on the coalface which are worthy of mention, namely, the use of compressed air for blasting, and the practice of forcing water into holes drilled in the seam to reduce the amount of coal dust in the atmosphere and to permit the discharge of explosives when actually under water pressure.

The present successful equipment for compressed air blasting originated in the U.S.A. Air is compressed to 10,000/12,000 lb. per square inch and flows down a steel pipe $\frac{1}{2}$ or $\frac{5}{8}$ in. internal diameter (1 in. outside diameter) to the face where it is then led via a flexible hose pipe to a tube or shell. The operator inserts a steel sealing strip at the face end of the shell which he puts in the shothole; he then retires a few yards and opens a valve in the compressed air range to admit the air to the shell, turning it off as soon as the sound of the flowing air ceases (as that shows the shell pressure is equal to line pressure) and waits for the steel strip to burst, on which the air issues at the back end of the shell with enough force to shatter most coals. The process is both safer and more convenient than ordinary explosives. The shell can be used repeatedly, all that is necessary is to insert a fresh strip for each

discharge. Providing the machine blasts more than 400 tons of coal per day it is as cheap as ordinary explosive, becoming cheaper the more it is used.

The idea of pumping water into the coal *in situ* to suppress dust is not new but it is only comparatively recently that apparatus has been available for doing so easily and quickly. Not all coals are amenable to the treatment: some are so dense that the water cannot penetrate even at 4,000 lb. per square inch; others are of such open texture that the water passes through the seam into the roof or floor, causing them to disintegrate.

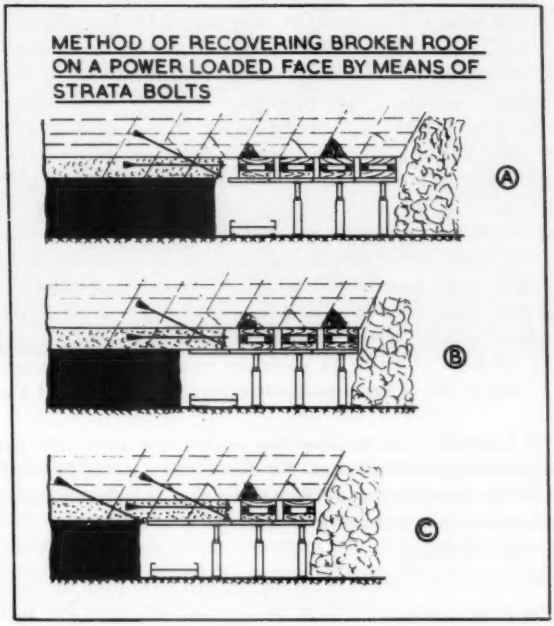


FIGURE 2

An extension of the process has led to pulsed infusion shotfiring. In this the shothole is first infused with water under pressure, then the apparatus is taken out, the explosive inserted, the apparatus replaced, the water pressure re-applied and the explosive fired. The risk of igniting firedamp is thereby minimized, and the amount of dust is reduced. The method cannot be used when the coal is undercut, as the water could not be retained, so the quantity of explosive required per ton of coal is somewhat greater than for normal blasting.

A development of recent date, also introduced from the United States of America, consists of the use of bolts with expanding heads for holding weak roof strata together, thereby increasing their strength. Such bolts can be used on the coalface,

at ripping lips where the roads are being made, or in roadway enlargement. The principle is simple. A hole, 4 ft. to 6 ft. long, is drilled into the strata to be held, at about 90° to the plane of weakness, and a bolt is inserted with the expanding head leading, a plate or washer is slid over the bolt up to the face of the rock and the nut applied and tightened. As the tightening nut pulls on the bolt the expanding head catches against the side of the hole and anchors itself securely; thus the beds are pulled together. In the simplest case, a weak bed which is exposed can be suspended from a stronger one which lies 2 ft. or 3 ft. above, out of sight. In other cases a number of weak beds can be so clamped together that they stand with the aid of normal supports which would not otherwise be adequate. In yet other cases loose pieces can be prevented from falling out from exposed rock faces.

On power loaders the latest developments might be mentioned. It will be realized that the primary purpose of the power loader is to tear the coal from the solid face and put it on to a conveyor. The process makes 'smalls', and broadly speaking, the more successful the machine the more 'smalls' it produces. The demand for 'large' is one reason why power loading has not advanced more rapidly this last year or two.

Progress has been made chiefly in improved performance of existing machines by the use of greater horsepower and the application of hydraulic drives. From faces 250 yards long in seams say 3 ft. 6 in. to 4 ft. 6 in. thick it is fairly common now to obtain by power loaders up to 1,000 tons per day at a face output per manshift of 11 to 12 tons, and in South Yorkshire recently figures have been published showing face advances of up to 23 yards per week. This was something quite unthought of only a year or two ago, 8 yards then being considered a satisfactory figure.

Recently in Lancashire one machine has yielded over 1,600 tons per day at a face output per manshift of 17 tons. No doubt other coalfields could quote as good, or even better, performances, which shows that once this demand for 'large' coal has been met the way is clear for a further jump in efficiency.

(*b*) *On the Haulage Roads*

Let us now consider the means of getting the coal away from the face.

In the great majority of cases this is by conveyor delivering into tubs or mine cars at a loading point which may be nearer the pit bottom than the workings or vice versa. Where the gradient is easy there is much to be said in favour of conveying almost to the shaft bottom, as is done in some of the most productive mines. If the gradient is very slight it may well be better to haul by locomotive for the first mile or two from the shafts, especially if cars of two tons capacity and upwards are used. This applies particularly to mines laid out on horizon principles, in which the main roads are driven level from the shafts at various depths and the seams are worked between successive levels.

Locomotives have the advantage of being useful for two-way traffic, carrying men and materials as well as coal. The locomotives themselves can be diesels of, say, 100 h.p. weighing 15 tons, battery driven of 45 h.p. weighing 14 tons, or more powerful electric locomotives of 190 h.p. weighing 25 tons and driven from overhead trolley wires.

FIGURE 3. *B.J-D 125 h.p. magnamatic shearer loader at Whitehill Colliery*

Of these the last one is undoubtedly the most efficient for hauling large outputs over long distances but it requires somewhat special underground conditions: there must be no risk of gas, the road must be high to give the necessary clearance for the conductor and, what is most important, the road must be stable. In practice it is this condition which is usually the limiting one. The way in which transport efficiency has improved is shown by the following table:

TABLE V

MANSHIFTS PER THOUSAND TONS—TRANSPORT

Year	*Great Britain*
1954	158
1955	163
1956	169
1957	172
1958	140
1959	128

(*c*) *Hoisting*

The orthodox system is to employ two cages in one shaft actuated by a drum-type of winding engine with ropes attached at either end of the drum, one over and the other under it, so that as one cage ascends the other descends and they arrive at pit top and bottom simultaneously. So long as hoisting is to take place from one level for some years this is as good an arrangement as any, but when it is necessary to hoist at will from any one of several levels it is better to have only one cage, or skip, and a counterweight; the cage can be brought opposite the desired landing without bothering about the position of the counterweight, and to compensate for the loss of the other cage the one in use can be made bigger. This is a positive benefit for electric winding engines which are most efficient with a heavy load raised slowly.

With modern equipment the ropes have become large and heavy, being of 2¼ in. diameter locked coil weighing 74·28 lb. per fathom or 16·5 tons for a 1,000 yard shaft, so in recent years, with the introduction of the counterweight, has come the friction winder using four smaller ropes side by side in place of one. Such ropes need be only 1¼ in. diameter to give equivalent breaking strain. To balance them there are suspended beneath the cage, forming a loop in the pit bottom and coming up to the underside of the counterweight, two ropes of equivalent weight so that the only out of balance load in the system is that of the coal itself. Movement is imparted to the ropes simply by the friction between them and the drum, the circumference of which is lagged with wood, grooved to take the ropes.

For maximum shaft capacity skips are better than cages. Unfortunately, skips cause breakage and so are not quite so popular as they might otherwise be.

(*d*) *Ventilation*

This is, of course, the primary essential underground, but fans are so reliable and give so little trouble that they are apt to be taken for granted. However, a word on modern developments will be appropriate.

Fans are of two main types. The centrifugal, which draws air in through the central orifice and discharges it radially via the periphery, and the axial flow, in which the air flows past a number of propellers set one behind the other. The centrifugal fan is most useful where a high ventilating pressure is required, say 10 in. of water gauge or over; the axial flow if it is necessary to move large quantities at a lower pressure.

The weight of air required per day to ventilate a modern mine producing, say, 4,000 tons per day may well be 35,000 tons (750,000 cu. ft. per min.) and the fan motor will be 2,000 h.p. It must run year in and year out and so is a heavy power consumer.

A most useful aid to improved ventilation has been the introduction in recent years of methane drainage. This has been made possible by the development of extractors suitable for underground use and rapid boring machines capable of drilling holes through 150 ft. of strata in a few hours.

The quantities of firedamp contained in the strata are immense. Usually the gas is liberated quietly during the working of the coal and passes out of the mine

with the ventilating current. But in certain seams the quantity given off is too great for reasonable ventilation velocities and quantities and special drainage is then invaluable.

It is seldom possible to draw gas from the virgin coal; it is usually extracted from the beds above the working face, actually as they are lowering, because then the gas can be drawn from the cavities in which it has accumulated.

The process consists essentially in drilling upwards from the return gate, and sloping over the waste, a borehole for, say, 150 ft. and cementing in it a pipe.

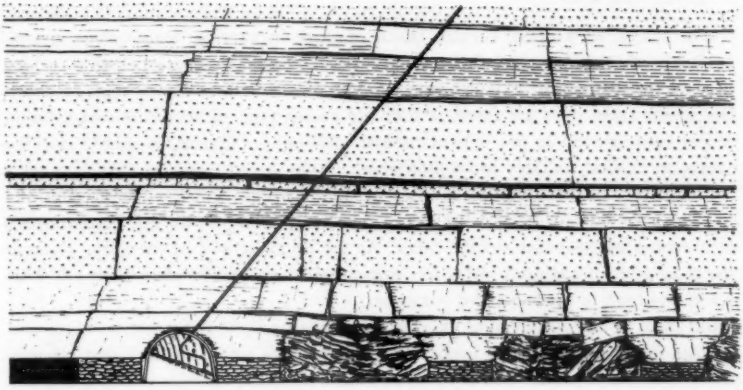


FIGURE 4. *Methane drainage*

The gas is obtained by suction and the yield will vary from hole to hole. By drilling a succession of holes, as the face advances, and coupling them to a common suction main, a total of 1,000 cu. ft. per minute of pure methane may be collected in the more gassy mines. The gas, if small in quantity, can be piped to a main return airway and discharged in the general body of the air. If the quantity is large it may be piped to the surface for colliery power or for sale to the local Gas Board. But however efficient the extraction may be, it is usually only possible to collect about half of the total emitted; the balance passes off in the air stream.

(*e*) *Other Underground Processes*

Before leaving underground operations two other developments should be mentioned, namely, the much more rapid sinking of shafts and driving of tunnels now being achieved.

Formerly a rate of 40 yards per month of completed shaft, 18 ft. internal diameter, was considered good, so that a shaft 880 yards deep took over two years of actual sinking, quite apart from all the preliminary work of erecting the headgear and winding engine. Recently, using South African methods, speeds of 100 yards per month have been attained in shafts 24 ft. diameter, an increase of four times in the volume of ground excavated and of $3\frac{1}{4}$ times in walling.

Similarly, tunnels which were driven at 40 to 60 yards per month can now be driven 300 to 400 yards in the same time, thanks to improved drilling and shot-firing techniques and the use of power operated shovels.

The overall result is that development costs can be held, if not actually reduced, and projects can be brought to fruition so much earlier. On a £10 million colliery a saving of one month means some £50,000 saved in interest charges alone.

2. *On the Surface*

Coal Preparation

The seams, as worked, contain bands of stone in varying degree often accompanied by thin shales which fall and mix with the coal, and the seat earth on which they sit may be so soft that it comes up with the bottom layers of coal. In short, few seams these days are clean as they are gotten; the run-of-mine may contain 30 per cent or even 40 per cent of rubbish although, of course, in such a case the operation is most unlikely to be profitable.

Cleaning of the coal above 4 in. may be done by hand sorting. This has all the advantages and disadvantages one would expect; flexibility on the one hand coupled with erratic performance on the other. At the opposite end of the scale, sizes of less than 1 in., if required for power station use, may not be cleaned at all. This is a saving both to producer and consumer.

But most of the output must be cleaned mechanically (62 per cent in 1959) and for this there are two main processes. One depends upon the fact that when a mixture of coal (Specific Gravity 1·3) and shale (Specific Gravity 2·5) is immersed in water their relative densities become 0·3 and 1·5, hence in a pulsating current the coal will rise whilst the shale will sink. A washer based on this principle was invented by Baum in 1892 and, with modifications for automatic operation, is still an efficient machine for sizes between 6 in. and $\frac{1}{50}$ in.

The other, introduced in recent years, depends simply upon creating a fluid of such density that coal floats in it and shale sinks. No satisfactory liquid exists naturally, so one has to be made by mixing intimately with water some dense mineral, e.g., sand, finely ground magnetite or even shale, and agitating it to maintain the consistency. In this way a fluid of effective specific gravity ranging from 1·3 to 1·9 can be made.

Theoretically such a fluid could be used for washing all sizes of coal/shale; in practice it is preferable to wash from say 8 in. down to 1 in. by dense medium; below 1 in. by Baum washer and below $\frac{1}{4}$ mm., where it must be cleaned, by froth flotation. In the latter process a frothing oil is mixed with water to form an emulsion which carries with its bubbles, as they rise to the surface, tiny particles of coal, the shale sinking to the bottom of the vessel.

Sometimes the coal is associated with a carbonaceous shale of very nearly the same specific gravity as itself and, in that case, hand screening has to be introduced after washing.

So far it has been implied that the run-of-mine mineral, whilst being dirty, is consistently so, and that it is being put into the cleaning plant at a constant rate.

Of course this is not the case; the input varies as to quality and quantity, and it is this which causes most of the inconsistency in results.

The table shows the growth of mechanical cleaning over the years—it is a growth which will continue.

TABLE VI

COAL CLEANING

Year	*Mechanically*	*By Hand*	*Untreated*
	%	%	%
1947	48·2	30·6	21·2
1953	54·1	26·9	19·0
1954	55·4	25·1	19·5
1955	57·3	22·8	19·9
1956	59·3	20·2	20·5
1957	61·1	17·5	21·4
1958	61·8	15·6	22·6
1959	62·1	13·8	24·1
1960 (1st half)	62·0	12·4	25·6

CONCLUSION

I hope I have shown by a limited number of illustrations that our industry has, in spite of many difficulties, made great technical progress. That we have still a long way to go, no one knows better than the mining engineer; our aim to-day is to mechanize to the maximum both on the surface and underground so that machines and not men perform the hard slogging work.

DISCUSSION

BRIGADIER J. V. TOPHAM (The Combustion Engineering Association): May I ask a question? In these various mechanical processes that you have shown do you find that you get an equal proportion of fines throughout the total output, or is it possible to reduce them by the speed or conditions under which you work, or is there any development towards a different type of mechanical breaker which would, in fact, reduce the fines?

THE LECTURER: There is no simple answer to the question. The plough causes the least degradation. The other machines depend upon their ability to cut their way through the coal and the amount of smalls made varies with the thickness of the cut. If we consider the normal horizontal cutting jib which cuts out a band about six inches thick to a depth of 4 ft. or 5 ft., the quantity of fines is not excessive because the subsequent breakage can be regulated by the amount of shot firing done. If, however, the machine is one which takes out the whole of the coal, the smalls become a problem. One way of reducing them is to have a machine which will travel through the face more quickly, since the faster the rate the less the churning effect. This applies for more powerful machines, 120 h.p. compared with the 75 h.p. which was considered ample a few years ago. Another way is by reducing the diameter of the cutting disc or drum so that the proportion of the total it removes is kept down; for

example, in a seam 5 ft. 6 in. thick with a disc 3 ft. in diameter there is a good chance that the top 2 ft. 6 in. will come out as fairly large coal. I think the real answer to your question is that we try to consider each case and use the apparatus which will give us the least segregation.

MR. W. G. MARSKELL (Research Department, Babcock and Wilcox Ltd.): I should like to ask whether, instead of hauling coal long distances underground, it would not be possible to pump at least the smaller sizes to the surface hydraulically from near the working face?

THE LECTURER: I think the straight answer to that is 'yes', as a physical process, although it has only been applied as far as I am aware in a limited number of cases. Experiments are being made to try and bring it on to a regular working basis. Of course, it will be realized that the coal will be intimately mixed with water and its effect on the clay and other adventitious materials must be considered, so that it is quite difficult to do in practice.

MISS ELIZABETH DERBY: I should like to ask two questions. First, is there any future for the underground gasification of coal? Secondly, would a pithead be a good place for an electricity generating station?

THE LECTURER: With regard to the first question, I can but say that strenuous attempts have been made in this country to gasify coal over the last, I should think, ten years, but without success. With regard to the second, the answer is undoubtedly 'yes'. There is no doubt that in times gone by we might have gained a good deal if we had done what has been done on the Continent and had generating stations near to the collieries. On the Continent, particularly in the Ruhr, the colliery companies own the power stations and the greater part of the power produced in Western Germany was colliery-produced power. That did not happen in Great Britain. The stations now go where there is an ample supply of water rather than where there is an ample supply of coal. We cannot put the clock back but, undoubtedly, if some thirty or forty years ago we had moved in that direction I think it would have been beneficial.

THE CHAIRMAN: It now falls to me to propose to Mr. Glossop a vote of thanks for his lecture. I think we must all realize—at any rate we in the industry do so—that it is very difficult for people outside the industry to be properly informed of what goes on within it. Indeed, whilst that is so regarding many industries, I think we suffer from a particular difficulty in that, working underground, it is not so easy for people calling upon us at our offices to pop into the pit and have a quick look round as can be done in a works. Similarly, it is more difficult for us to produce illustrations, even though the art of underground photography has been brought to quite a high standard. From all sorts of points of view we tend to be living rather much in a closed shop, and as a result we tend to criticize our critics for being ill-informed.

I think you will agree that Mr. Glossop has made a very valiant attempt to deal with what is largely technical matter in a way which, at any rate, the semi-technical can understand completely, and even the man in the street is able to follow his discourse which shows that big efforts are being made in the industry to change the methods, of working, the direction in which developments are going, and the prospects of further improvement. Mr. Glossop, may I offer you our very sincere thanks for your lecture?

A vote of thanks to the Lecturer was carried with acclamation and, another having been accorded to the Chairman upon the proposal of Mr. C. M. Vignoles (a Member of Council of the Society), the meeting then ended.

THE WEST INDIAN SUGAR INDUSTRY

A paper by

PETER RUNGE

Vice-Chairman, Tate & Lyle Ltd., read to the Commonwealth Section of the Society on Thursday, 24th November, 1960, with Garnet H. Gordon, C.B.E., Q.C., Commissioner in the United Kingdom for The West Indies, British Guiana and British Honduras, in the Chair

THE CHAIRMAN: About 45,000,000 tons of sugar are produced yearly throughout the world. Of that amount, 1,000,000 tons is produced in the West Indies. Sugar constitutes 50 per cent of the agricultural products of our area and about 21 per cent of the overall domestic exports. That indicates to you the importance of sugar in the economy of the West Indies.

There is no one better qualified than our speaker this afternoon, Mr. Peter Runge, to speak to us on this industry in the West Indies. Mr. Runge, as the Vice-Chairman of Tate and Lyle, is very closely associated with the industry, because the name Tate and Lyle is synonymous with sugar, not only in the United Kingdom, but throughout the world. I am sure many of you will recall the campaign of some ten years ago in which what one might describe as a work of art became quite familiar to you as 'Mr. Cube'. Our speaker was very closely associated with the launching of that programme, so closely connected with the preservation of private enterprise.

There is little about this industry that he does not know, and I am sure that we shall listen to what he will tell us with a great deal of interest.

The following paper, which was illustrated with lantern slides, was then delivered.

THE PAPER

WHAT IS SUGAR?

I must start this paper with a definition of my subject—the West Indian Sugar Industry. By sugar I mean the ordinary household article which we know so well and mostly eat in its refined form as granulated, caster, cubes or in manufactured foods. The average consumption in the United Kingdom is to-day 112 lb. a year. Four hundred years ago its consumption could be compared with that of caviar.

Sugar, or sucrose, is one of a group of compounds called polysaccharides. In comparison with other foods of major importance such as proteins, fats and starches it has a simple molecular structure of remarkable stability. This accounts for the phenomenally high degree of purity to which refined sugar can be brought and for many of its unique properties. No special precautions have to be taken to preserve it and it can be eaten uncooked after years—maybe centuries—of storage in normal atmospheric conditions. It is completely digested and it cannot give you indigestion. It is absorbed almost instantaneously through the agency of the

enzyme invertase which occurs in the stomach and whose only function is the hydrolysis of sucrose. Sugar is indeed a natural food.

The world consumption of sugar is some 45 million tons. It has been growing in geometrical progression for at least the last 60 years, increasing at the rate of 2·9 per cent per annum. Consumption varies violently between one country and another. The largest consumer is Australia with 118 lb. per head per annum; we consume 112 lb.; the United States 96 lb.; France 66 lb. and Jamaica 77 lb. At the low end of the scale Nigeria consumes 4 lb. per head per annum and China 3 lb. The Food and Agriculture Organization has made an able statistical study of consumption and has found a significant correlation with both price and per capita national income. A *decrease* in price of 10 per cent or an *increase* in national income of 10 per cent are both associated with an approximate *increase* in consumption of 6 per cent.

Medically speaking, no harm would result if sugar consumption rose above the highest recorded average of 118 lb. per annum; there must be many people in this room this evening who consume more than that. But further progress is likely to be slow in the high consuming countries where supply is unrestricted and sugar is already the cheapest source of calories. In the United Kingdom the cost per 1,000 calories of bread is 6½*d.*; of potatoes 10*d.*, and of sugar 5*d.*

Sugar satisfies 17 per cent of the calorie requirements of the nation. The following table shows how, during the war, rationing forced a switch from sugar to bread consumption and how unrationed demand has reversed the process:

CIVILIAN CONSUMPTION OF CALORIES IN THE UNITED KINGDOM PER HEAD PER DAY

	1934–38	%	1940–43	%	1956–59	%
Sugar and Syrups...	451	15	316	11	527	17
Potatoes	123	4	157	6	158	5
Grain Products ...	899	30	1,037	37	813	26
Other	1,511	51	1,304	46	1,649	52
	2,984	100	2,814	100	3,147	100

I have said enough to emphasize that sugar is far from being the fancy luxury which some cranks would have us believe. It is a very important and very cheap food.

WHAT ARE THE WEST INDIES?

In this paper the West Indies embrace those mainland territories and islands in the Caribbean which come under the tutelage of Great Britain. They have an area of 100,000 square miles with a population approaching 4 million. They spread along half the circumference of a giant ellipse stretching from British Honduras in Central America, through Jamaica, the Leeward Islands, the Windward Islands,

Barbados and Trinidad to British Guiana on the South American mainland. Thus a string of islands are flanked with two mainland anchors. These anchors account for 90 per cent of the land area but only 20 per cent of the population. Distances are vast: 2,000 miles separate Belize in British Honduras from Georgetown in British Guiana.

The population is multi-racial, negroes being in the majority. There are also large numbers of East Indians, particularly in Trinidad and British Guiana. The original races which were in occupation when the New World was discovered by the Old have disappeared. In the fifteenth century the gentle Arawaks were in the process of being gobbled up—often literally—by the fierce Carib. They died out completely after enslavement by the Conquistadores. The Carib race survived the Arawak by several centuries, but except for a handful in Dominica this people, too, has disappeared.

The climate is typical, of course, of the latitudes, hot with clearly defined rainy seasons. Rainfall is remarkably variable. The driest areas have perhaps 25 inches a year, on a par with the east coast of England but producing, through higher evaporation, an aridness in which only scrub and deep rooted plants can survive. The wettest areas, and they are sometimes less than twenty-five miles from the driest, have over a hundred inches a year and support the most luscious vegetation. The whole area, except British Guiana and Trinidad, is subject to hurricanes, from which damage is experienced about once every four years. Earthquakes are not infrequent and can be very severe.

Politically, the West Indies have matured quickly since the war. The islands are federated and are headed towards full independence. The mainland territories, however, have kept aloof from the federation. Jamaica, the most politically advanced, has developed a two-party system of government. It has simultaneously developed a trade union system which suffers from being closely integrated with the main political parties. There is, as a consequence, much confusion between party political issues and purely industrial issues. This confusion, coupled with the natural effervescence of the Jamaican, often makes negotiations difficult and sometimes exasperating. A love of exaggeration, a natural gift for oratory and the exoticism of a tropical island do not in combination lend themselves to calm, logical and orderly discussion and negotiation. The important thing, however, is that in the largest island there are stable political parties and stable trade unions. It must be earnestly hoped that they will be an inspiration and example to the other islands and territories.

Sociologically the besetting problem is the contest between a rapidly rising population on the one hand and unemployment, poverty and ignorance on the other. The receipt for success is easy to pronounce—raise the national product—but infinitely hard to achieve. For it is not only a question of increasing production, but also of finding markets. As we shall see, sugar is an excellent example of the difficulties.

ECONOMIC BACKGROUND

The natural resources of the West Indies are confined to oil, bauxite and agricultural products. Agriculture still plays a leading part in the economy, but

both oil and bauxite are rapidly overhauling it; oil in Trinidad and bauxite in Jamaica and British Guiana. Oil refining is expanding in Trinidad and the processing of bauxite into alumina is a growing industry in Jamaica. In general, however, the establishment of secondary industries has been slow, due to the smallness of local markets and the grave difficulties in developing overseas markets.

Tourism is becoming an important source of income and will grow in importance. Central heating in North America does not make the winters any warmer there, and increasing wealth and leisure will bring office and factory workers south in steady streams in search of sun. But the development of tourism is at best slow and in the meantime agriculture remains the most important industry. And of agricultural products, sugar is the Queen.

Timber, Tobacco, Cocoa, Copra, Coffee and Citrus; Bananas, Spices, Peppers, Arrowroot and Ginger; Cotton, Rice and Chewing Gum are all produced in worthwhile quantities, but they cannot either individually or collectively compare with sugar, which is grown in every island for local consumption and for export from Antigua, Barbados, British Guiana, British Honduras, Jamaica, St. Kitts and Trinidad. In Barbados and St. Kitts it accounts for 90 per cent of the value of exports; in British Guiana for some 50 per cent; in Jamaica 30 per cent; in Trinidad alone is it of relatively minor importance accounting for only 10 per cent of her exports. In all about a million tons is exported with a value of some forty million pounds. The sugar cane was introduced into the West Indies by the Spaniards. Its fortunes have swung to and fro through the centuries for it has been the plaything of politicians. But it has always managed to make a comeback. How else can it be with a plant which provides more calories per acre than any other annual crop?

AGRICULTURAL OPERATIONS

Sugar cane growing is one of the few monocultures. It is a grass and shares with the varieties we know at home the ability of growing on the same piece of land for year upon year without becoming diseased or depleting soil reserves. Grass has grown on the South Downs from time immemorial. Sugar cane has grown in the plains of Westmoreland in Jamaica since it was introduced there three hundred years ago. The similarity extends to the practice of annual cropping without replanting, made possible by the growth of a new root system each year. Both also are relatively shallow rooting and cannot, therefore, survive either conditions of drought or poor drainage. We cannot, however, stretch the similarity too far. Whereas grass seldom grows above knee height, sugar cane grows readily to ten or twelve feet and methods of cultivation have to be altered accordingly. Grass is grown to cover the ground completely, but sugar cane does not produce a canopy until it is six feet tall and there is consequently a weeding problem as there is with root crops or with kale. When freshly ploughed land is put into cane, short lengths of unripe sugar cane are used as seed and are planted in rows five feet apart with two feet separating each plant. According to the relative importance of conserving moisture or of providing drainage for excess rainfall, the planting is either on the flat or on raised beds. In its early growth stages it is inter-row cultivated to prevent competition from weeds or treated with selective weedkillers. Weeding can also be

Growing sugar cane

carried out by the manual application of universal weedkillers which are lethal to cane as well as to weeds; this is made possible by the large intervals between plants. Fertilizers are also often applied manually to the plant itself. During growth, pest control is carried out by men carrying knapsack spray units or by aeroplane if the chemical being used is cheap enough to be broadcast.

The ideal rainfall required is some sixty to seventy inches a year reasonably spread over the summer months, and if this is available no irrigation is necessary. With a rainfall lower than fifty inches, irrigation is advisable and at twenty-five inches it is essential. Water can be applied either by means of a system of canals and drainage channels or from overhead by means of pressure sprays. Both systems are in use. Where pumping costs are cheap and where winds are high, surface irrigation is used. But where water is scarce or expensive to win, the overhead system finds favour because it uses a third of the amount of water for the same degree of irrigation.

Planting is done either in spring or autumn; harvesting takes place in winter and spring. For the first cropping after planting, harvesting takes place after an interval of up to eighteen months. After harvesting, the cane stool is allowed to

re-grow; it is then called a ratoon and is harvested in the following year. Ratooning is continued until yields have dropped to the point at which it is judged to be more economic to re-plant. On the average, cane is allowed to ratoon four times. Thus five crops are reaped from one planting and twenty per cent of the acreage growing cane is ploughed each year.

Cutting cane

Harvesting involves the cutting of the cane, its trimming and loading into carts. Up till now these operations have all been done manually, but a start at mechanical loading is to be made in Jamaica next year. Having harvested the cane—some 30 tons from every acre—there remains the task of transporting it to the factory for extracting its sugar content. Oxen, water buffalo or mules are rapidly being replaced by mechanical road transport which reduces handling and the time spent in transit; this is particularly important because sugar cane deteriorates rapidly. As transport becomes faster and cheaper, so factories are able to serve larger areas, and to-day factories with a capacity to process a million tons of cane during a crop are not uncommon. Factories with a capacity of less than 100,000 tons, unless they are completely isolated, are not economic.

Cut cane being transported to the factory

As in all other branches of agriculture, the search for higher yielding varieties is unremitting. There are cane breeding stations all over the world which between them have bred strains as different from their wild ancestors introduced by the Spaniards as man hopes he is from the apes. The West Indies' cane breeding station is in Barbados; it is much admired.

In discussing the agricultural methods used in growing cane, I have had in mind the practice of large farmers and company-owned estates. In low rainfall areas this type of farm is the rule because of the difficulties of combining peasant farming with irrigation, the cost of which can be so high—up to half the direct cultivation expenses—that it is uneconomic except when applied to large units. In natural rainfall areas, however, the position is quite different, particularly in the hills where mechanized farming is impossible. In those districts there are thousands of small holders growing between ten and a hundred tons of cane a year. Their methods, of course, differ from the intensive farming of the big man. They are particularly interested in long ratooning and robustness, and in consequence yields are low. The introduction of new methods to increase output poses some very difficult problems.

FACTORY OPERATIONS

A sugar factory is one of the most self-sufficient collections of machinery you

could find anywhere in the world. Its purpose is to extract sugar and molasses, and perhaps make rum and alcohol from sugar cane. It employs labour, a little oil for lubrication and two million pounds worth of buildings and machinery to extract 25,000 tons of sugar a year from a quarter of a million tons of cane. More water and fuel arrive in the cane than is wanted in the process and costs are, therefore, for all intents, limited to wages and depreciation.

The process is a simple mechanical one although chemical control is of vast importance, for to save one per cent of chemical destruction is to save one per cent of all the agricultural costs. The sugar juice is extracted from the cane by squeezing it through rollers like those of a complicated mangle; it passes through a series of these rollers, the solid matter leaving the last set exhausted of sugar, and now called 'bagasse', to be fed as fuel to the boilers. The juice is partially clarified and evaporated to a point close to crystallization. Crystallization itself takes place in vacuum vessels in which the syrup is ultimately reduced to an intimate mixture of sugar crystals and molasses from which no more sugar can be crystallized. The two are separated in centrifugal machines by spinning the mixture in a perforated basket through which the molasses can fly, while retaining the raw sugar crystals which, when the basket stops spinning, are easily removed for conveying to lorry or store. The extraction processes are then complete. From a well-farmed acre we have produced 4 tons of sugar and rather more than a ton of molasses with a combined food value sufficient to supply the whole of the calorie needs for 15 people for a year.

There has been a singular lack of technical advance in the extraction processes during the past thirty years. Increases in size of plant and improvements in design have brought economies, but there have been no innovations. The search for new methods of extraction, new uses for by-products and new applications for sugar itself will continue to occupy the sugar research stations of the world, but for the moment no epoch-making development can be foreseen. New techniques have been confined to the handling of the sugar after it leaves the centrifugal machines, and many savings have been secured in this field, particularly by way of transporting in bulk. The bag is rapidly disappearing from the West Indies. Raw sugar is stored, transported and loaded into ships without ever having seen the inside of one.

SUGAR MARKETS

World consumption of sugar is some 45 million tons, but only 6 million tons of this is traded in freely. The remainder is either consumed in the country of origin or is sold in restricted and price supported markets such as those of the Soviet bloc, France, the United States and the British Commonwealth. Almost every sugar-producing country has access to a preferential market for part of its production. The result of this is that the free market is under the influence of marginal production and marginal demand, and except under circumstances of exceptional shortages, prices on the free or world markets are low, often below cost of production.

A very interesting position is currently developing due to the quarrel between Cuba and the United States. Washington has cancelled the arrangements under

which America formerly took more than half of Cuba's production at highly favourable prices. Next year, therefore, we may find that 3 million extra tons of sugar from Cuba is seeking a buyer in the world market, while 3 million tons of former free sugar jostles for American favours. The West Indies hope to catch the eye of the Washington Sugar Administrator, having had their appetites whetted by a taste of high American prices this year when the Cuban embargo was first imposed.

But the West Indies' loyalties and vital interests lie in the Commonwealth market which is regulated by the Commonwealth Sugar Agreement and the Sugar Act. The Commonwealth Sugar Agreement, which covers a rolling period of seven years, deals with a total annual tonnage of 2·4 million tons, on part of which a fixed price is applied. The tonnage is allocated as shown in the table:

LONG TONS

Countries	*Total Export Quotas*	*Negotiated Price Quotas* 1960	*World Price Quotas*
Australia	600,000	316,500	283,500
The West Indies...	925,000	695,298	229,702
Fiji	170,000	126,600	43,400
Mauritius ...	470,000	353,425	116,575
South Africa and East Africa	210,000	163,525	46,475
	2,375,000	1,655,348	719,652

This quanity is consumed as follows:

	'000 *tons*
United Kingdom	1,761
Canada	500
New Zealand	100
Southern Rhodesia	14
	2,375

The negotiated price is reviewed each year with the British Government; it is arrived at by applying a formula which takes account of cost factors involved in producing sugar. The chief markets for the world price quotas are Canada and the United Kingdom, in each of which there is a preferential rate of duty for Empire sugar. Producers enjoy the whole of the duty Preference on exports to the United Kingdom because British sugar refiners have given an undertaking, other things being equal, to prefer Empire sugar to foreign sugar. Market conditions in Canada

allow a substantial part of the duty preference to be retained by producers there also. For exports to the United Kingdom, further assistance is given in the form of Colonial certificates which can be applied either to negotiated price quotas or world price quotas.

The proportions sold to the various export markets or for local consumption vary from territory to territory. It is misleading, therefore, to quote averages. But a measure of the effect of all the devices mentioned above can be got from the prices obtained so far this year by a typical Jamaican producer:

Market	*Sales*	*f.a.s. price per cwt.*
	%	*s.* *d.*
Jamaica	15	32 10
Canada	28	31 6
United Kingdom	47	44 1
U.S.A.	10	45 2
	100	39 0

This average was obtained in a period during which the world price of sugar moved between a low of 22*s.* 9*d.* per cwt. f.a.s. Cuba and a high of 27*s.* 1½*d.*

The instrument by which the price guarantee in the Commonwealth Sugar Agreement can be implemented, at the same time as preserving free enterprise trading, is the 1956 Sugar Act. By its terms, a Board is charged with the duty to buy all negotiated price sugar from Commonwealth producers and to re-sell it in competition with supplies of sugar being offered in the free market. Normally this involves the Sugar Board in a loss. To recoup itself, it has the power to levy a surcharge on all sugar imported or manufactured in this country. On the face of it, such an arrangement might be thought to result in the Board becoming a chronically weak seller; in practice, however, the British refiners' guarantee to prefer Empire sugar avoids this, and in addition, the leading British refiner has a special contract with the Sugar Board to relieve the Board of seasonal surpluses which might otherwise be a weakening influence. In the event, the Board sells sugar at prices rather higher than those obtainable elsewhere. The Board, incidentally, also has the responsibility of financing any deficits which may be incurred by the British Sugar Corporation in its manufacture of beet sugar, due to having to sell its products at world price level.

The guaranteed price thus having been assured to producers, it remains to implement the tonnage guarantees. They are dependent upon the Canadian and British markets. The trade to Canada relies upon the Preference given by Canada to Commonwealth sugar. So long as this continues, there will be an outlet for half a million tons annually. The trade to the United Kingdom relies upon the goodwill of the British refiners, their ability to compete with foreign refined or semi-refined sugar and the limitation of the beet sugar crop in the United Kingdom. At present a limit is placed on the total acreage of sugar beet, but as yields per acre have been

increasing rapidly during recent years, the tonnage of home grown sugar is growing. Consequently, the gap between the market required for Commonwealth sugar on the one hand and home trade consumption less home grown production on the other has been narrowing until to-day it is little more than 200,000 tons, out of a total consumption of 2,700,000 tons. This quantity, under present conditions, is the maximum amount of foreign sugar, whether refined or semi-refined, that can find a home in the United Kingdom without jeopardizing the Commonwealth Sugar Agreement. British refiners are hard put to limit competition to this figure, but so far have succeeded.

The recent improvements in beet yields in this country are an example of the great strides which have been made in recent years by all sections of the beet industry in improving efficiency and reducing costs. These advances have been more rapid than those achieved by the cane industry and, perhaps for the first time, beet sugar to-day is within measurable distance of competing with cane sugar on a cost basis. It is difficult to make exact comparisons, but we get a hint of how close things are from the accounts of the Sugar Board to June of this year. We see from them that the deficit incurred by buying Commonwealth sugar at guaranteed prices and selling at world prices costs about £16 per ton, while the deficit incurred by the British Sugar Corporation, after having sold its unsubsidized production at world prices, amounted to £15 per ton. It is true that these figures deal with the whole of the beet crop but only part of cane sugar production, the remainder of which is sold at lower prices; and it is true that the British Sugar Corporation have various cost advantages due to their privileged position, but it is a close race and cane producers should be on their guard. They must look to their costs. The tortoise is catching the hare.

One obvious way to reduce cane sugar costs is to follow Britain's lead and mechanize field operations. But in recommending such a course one must not too lightly brush aside the deep-rooted distrust and dislike of mechanical operations which still prevail in the West Indies. Both Union leaders and workpeople are greatly confused by the employment problem—as indeed is natural—but public opinion and government policy are becoming increasingly in favour of a steady advance in mechanization, suitably controlled to allow displaced labour to find new employment with the minimum of hardship. It will not be many years, in my view, before harvesting as well as loading are mechanized as they already have been in many parts of the world.

REFINING

So far we have been discussing raw sugar, but that is not the form in which it is ultimately consumed. An overwhelming proportion is first refined. The process of refining discards only 2 per cent as impurities, and many people ask why the raw product is refined at all. The simple reason is the obvious one—that that is how people like to eat sugar. Food faddists preach that refining is unnatural and that goodness is taken away from raw sugar by making it white, but that is nonsense. The impurities in raw sugar contain no vitamins and consist chiefly of organic and inorganic salts with a mild laxative action. These impurities by themselves are in no way harmful; indeed they can impart a distinctive and pleasant flavour

to the sweetness of sugar, and the finest examples which are frequently marketed as Demerara sugar are clean and wholesome. But this does not apply to all raw sugars which are normally not filtered and contain much suspended matter, and often organisms such as sugar lice as well as bacteria which can be harmful. To eat raw sugar is to pick up a boiled sweet from the pavement and pop it into one's mouth. The chances are that no harm will result, but the habit is not to be commended on that account. The fact is that you cannot *see* whether raw sugar is pure or not, whereas there is no doubt at all with refined sugar, to which 10 parts per million of ordinary atmospheric dust will impart a lack-lustre.

The second reason for refining sugar is purely economic. Because of its long keeping and free flowing qualities, it is so much easier to weigh, to store and to distribute than raw sugar that the housewife receives it cheaper refined than she would as raw. During the war, the maximum retail price for raw sugar was actually higher than that for refined.

The next question which may be asked is why the refining is done where the sugar is consumed and not where it is produced. This, too, is purely a question of cost. Raw factories do not work the year round and any refining equipment attached to them would not, therefore, be fully used; added to which about two-thirds of the consumption of sugar in a country such as the United Kingdom is in the form of small packets of one or two pounds and specialities such as Caster, Cubes and Icing, and of the remainder, a large proportion is delivered direct to manufacturing users either as bulk granulated or as liquid sugar. Where an ocean separates producer from consumer, it is quite clear that sugar in these forms can better be refined in the consumers' country. This being the case, it is not worth the while of a producer himself to refine the rump and having done so, compete with his best customer in order to sell it. This has been frequently borne out in practice. Even major refining installations in Cuba erected by such a powerful concern as the Hershey Corporation did not prove profitable and had to be abandoned by Hershey. Other attempts no doubt will be made in the future to refine in the country of origin, but they are all doomed to failure.

The refining processes themselves are simple mechanically, but require the most detailed chemical control. After having been discharged from barges or ships by a grab crane, the raw sugar is 'affined' by mixing with warm syrup to soften the film of molasses which is round each crystal of raw sugar, and by spinning in a centrifugal machine whose action is as I have previously described. The sugar left behind in the basket is dissolved in water and is treated with lime in a 'carbonatation' process in order to remove various colloidal substances and to provide a filter medium. The process, incidentally, eliminates small quantities of heavy metal impurities such as lead, which are frequently found in some raw sugars in quantities in excess of what is recommended by the Food Standards Committee. After filtering, the liquor, as it is now called, is passed over deep beds of charcoal to remove inorganic salts and also colour. The water white liquor which results is the material from which all the many qualities of refined sugar are made by variations of the basic crystallizing and separation processes.

As in raw sugar manufacture so in refining has there been little technical advance

during the past thirty years or so. Plant units have become bigger, centrifugal machines have become faster and more efficient, but no new process has evolved. Like raw sugar also, the closest attention has been paid to handling and to transport, and great strides have been made in this direction since the war. But these are developments which affect the manufacturing user of sugar—the jam, biscuit, cake, chocolate, sweet or mineral water maker. Although these people are taking an increasing proportion of the total consumption, almost a half still gets sold over the grocer's counter. The trend in the grocery trade has been towards factory packed 2 lb. packets and to-day very little sugar packed by wholesalers or retailers is on sale. The modern generation has never seen a poke of blue paper being deftly made by a grocer's assistant. The pressure from foreign refined sugar on British markets has played its part in bringing about this development. The stimulus of competition has found the cheapest way of getting sugar into the housewives' cupboard; it has minimized materials, handling, transport, clerical work and commissions. The retail price of granulated sugar is built up at the moment very roughly thus:

	d./per lb.
Raw sugar (world price)	3¼
Fiscal charges (duty, levy, etc.)	2½
Refiners' margin (cost and profit) ...	1¼
Distribution (cost and profit)	1
	8

It is a vital necessity for the West Indies to retain a stable and remunerative market in Great Britain. To do so there must be a well disposed Parliament and a friendly and efficient refining industry in the mother country. The West Indies has those things now and there are no signs of her losing them. The British housewife, that nicest of persons, is perfectly happy to pay a reasonable price for her sugar so long as she can feel that home and Empire producers are not *only* going to look to higher prices with which to cover higher costs; she would prefer to see them striving to increase efficiency to basking in the warm sun of subsidies.

And that is how the West Indies would like it too. There is nothing indolent about this new nation. Her people are out to earn an increase in their standard of living as well as to become independent. All they ask is that when the apron strings are cut, there will remain the advice, the affection and help that every adolescent leaving home expects and gets from his parents.

The following sources of information have been consulted in the preparation of this paper:

Tate & Lyle Limited.
The West Indies Sugar Co. Limited.
Ministry of Agriculture, Fisheries and Food.
Trends and Forces in World Sugar Consumption, by A. Viton and F. Pignalosa.
The Economy of the West Indies, edited by G. E. Cumper.

Economic Survey of Jamaica, 1959.
The West Indies and Caribbean Year Book, 1960.
International Sugar Council Year Book.
Sugar Board Report and Accounts, 1960.

MR. T. A. CULVERWELL: I should be interested to know whether there is any real difference between the beet sugar and the cane sugar from the point of view of calories.

THE LECTURER: There is none. There is only one way I know of, to tell sugar which has been refined from cane from sugar which has been refined from beet, that is to say if both have been fully refined. The only way I know of—but I have my eye on the Director of Research of Tate and Lyle, whom I see over there—is to grind the sugars up to as fine a state as you can, put them into a bottle and cork them up tight. You leave them that way for about a week, and then one morning—when your nose is very clear and your eye has no trace of yellow in it at all—you go to each of those bottles, quickly take the cork out, smell and put it back; you will be able to detect the faintest smell of beets in the sugar which has been refined from beet. As far as I know there is no method of chemical analysis to detect it—which merely goes to show how strong the British nose can be!

THE CHAIRMAN: Sir, the absence of any further questions indicates quite clearly the thoroughness with which you have covered this most interesting subject. I believe that it will be the wish of us all here to express our heartfelt thanks to you for the very interesting address that you have given us; the assembly of so many facts; the presentation of them so authoritatively, and the illustration of so many aspects of the industry by the very attractive and well-chosen set of slides.

I must say what pleasure it has given me to have presided at this meeting and to have heard the advocacy on behalf of the industry, so far as the West Indies are concerned. When I introduced the speaker I attempted to illustrate the importance of the industry to the West Indies, and as he went on I am sure that that importance was re-emphasized in your minds. As he drew to the conclusion of his address I am sure you will have realized the close connection there is between the West Indies and this country, and the great assistance which our industry receives from this public. In presenting this informative address to this company Mr. Runge has done a great service to us in the West Indies as well.

A vote of thanks to the Lecturer was carried with acclamation and, another having been accorded to the Chairman upon the proposal of Sir John Woodhead, the meeting then ended.

THE HISTORY AND SCOPE OF THE SOCIETY'S LIBRARY

A paper by

D. G. C. ALLAN, M.Sc.(Econ.), F.R.Hist.S.,

Curator-Librarian of the Society, read to a special meeting of the Society on 5th December, 1960, with Dr. R. W. Holland, O.B.E., M.A., M.Sc., LL.D., Chairman of the Library Committee and a Vice-President of the Society, in the Chair

THE PAPER

The Society's Library in its present form consists of three distinct collections. The largest is the lending section of modern and Victorian works, mainly concerned with the development of art and design and other special interests of the Society, which have been acquired during the last twelve years. A smaller collection is devoted exclusively to the major international exhibitions, and contains certain rare items acquired by the Society as a result of its work in this field from 1851 onwards. Intermediate in size is the collection of books and pamphlets published before 1830. These are catalogued separately under the heading of 'Early Works' and in their subject-range reflect the original classification of the Society's interests: Agriculture, Chemistry, Colonies and Trade, Manufactures, Mechanics and the Polite Arts. It is with the growth of this collection that the history of the Society's Library begins.

At its first meeting the Society decided that a book should be bought. This purchase was its first acquisition of corporate property, excluding, of course, the paper upon which the first minutes were written. For the meeting was held in a coffee house and even the chairs and table used by the members were hired. Later it acquired furniture of its own and a permanent meeting room and exhibition hall and, twenty years later, the house in Adelphi. But in 1754 all available money was needed to pay the premiums offered by the Society in its campaign to increase the economic prosperity of the country. The book bought contained details of the current customs duties and was known as *The Book of Rates*.[1] The Society needed to know what exports and imports were favoured or discouraged by the Government so that it could play its own part in tilting the balance of trade. The *Book of Rates* is no longer in the Library, but there is an inscribed copy of Sir Charles Whitworth's *State of the Trade of Great Britain in its imports and exports progressively from the year 1697* (1777), presented to the Society in the year of its publication. Whitworth was a leading authority on Government finance and was one of the first vice-presidents of the Society.[2] His book is a good example of the sort of information the Society needed for its work in the class of 'Manufactures' and 'Colonies and Trade'.

The Society's minutes for 26th March, 1755, record the receipt of the first book to be given to it as a present. This was Edward Wade's *Proposal for improving and adorning the island of Great Britain* (1755), which advocated the policy of nation-wide afforestation,[3] subsequently adopted by the Society. The book is still preserved. The Society also retains its second recorded purchase, the 1755 edition of John Chamberlayne's almanack *Magnae Britanniae Notitia*.[4] Its third purchase, an unspecified edition of Jethro Tull's revolutionary work on 'Horse-Hoe Husbandry' is not extant,[5] but the acquisition, like that of a collection of works on hemp in 1756[6] and of Philip Miller's *Gardener's Dictionary* in 1761,[7] suggested the utilitarian criteria which governed the Society's book-buying in its early years.

The Society's first book-plate (the obverse, on the left, is copied from the Society's original medal, designed by 'Athenian' Stuart)

'The Library of the Society of Arts', it was said in 1828, 'has been formed partly by purchase, partly by donations. The purchased books are on topics that have a direct reference to the objects of the Society. Those acquired by donation are either presents from their respective authors, or from individual members who have at heart the accumulation of a respectable library of useful knowledge and rational amusement.'[8] Presents of books accumulated long before the Society thought in terms of having a 'library' as such. The Manuscript Transactions record some thirty-one gifts between 1770 and 1782.[9] Among the donors were two important members of the Society, Joshua Steele and Arthur Young, who also achieved some literary success. Young is the best remembered, and one of the works he presented, *A Tour in Ireland* (1780), has been described as the chief authority on Irish economic conditions during the latter part of the eighteenth century.[10] Steele's work was more idiosyncratic. His *Essay towards establishing the melody and measure of speech* (1775) is an attempt to record the spoken word in musical form and is valued by students of the drama for its transcription of Garrick's rendering of 'To be or not to be'.[11]

After 1785 lists of books presented appeared in the printed *Transactions*, but there was still no printed catalogue.[12] The earliest reference to a manuscript catalogue of the Society's books occurs in the minutes for February, 1779.[13]

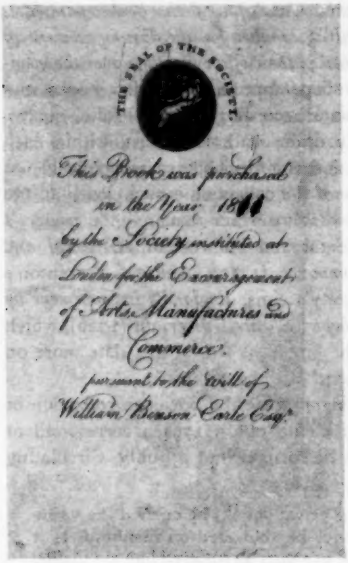
However, it was not until 1790 that a printed *Catalogue of the books, pamphlets and maps, belonging to the Society Instituted at London for the Encouragement of Arts, Manufactures and Commerce; and reserved in their office, for the use of the members*, was published. The 1790 catalogue lists approximately 300 books and pamphlets. The entries are arranged in groups according to sizes—folio, quarto, octavo, and duodecimo—and alphabetically under authors' names within each group. No dates of publication are given and the alphabetical principle is not always carefully followed. The subject range of the collection is tied closely to the interests of the Society. Among the seventy-two items which remain in the Society's possession are Adam Anderson's monumental and still useful *Historical and chronological deduction of the origin of commerce* (1787), Andrew Yarranton's seventeenth-century anticipation of the Society's aims, *England's improvement by sea and land* (1677), and Jacob Leupold's *Theatri Statici Universalis* (1726), which is a rare German treatise on mechanics. The emphasis was at this date more on 'useful arts' than on the 'rational entertainment' of the members.

The appearance in print of the 1790 catalogue made the Society's collection of books known outside the circle of London members. In 1794 a correspondent urged that the Society's 'Books and Papers be formed into a public Circulating Library':

> Let the knowledge now locked up in your private books be opened [he wrote to the Secretary] . . . and let its beneficence be showered on mankind. Is it not better your Books be destroyed by gentle use than be suffered like old maids, to moulder uselessly into oblivion? . . . Suppose a charge was made for the use of them as in other Libraries, that money to be applied in the Extension of Rewards, medals—purchase of books, payments of little Expenses, etc.
>
> Send your books to me, and I will soon open them to the World, reserving only a trifle to reimburse me for my trouble, Rent of the Rooms they occupy, and the unavoidable Expenses.[14]

The proposal was laid aside.[15] Three years before, special bookcases had been made to hold the Society's collection[16] and it is inconceivable that the members would have parted with their books in this fruitful period of the Library's history. In 1796 a bequest of two hundred guineas was received by the Society under the will of William Benson Earle. Either the principal or interest had to be applied 'in the purchase of Books for the Public Library of the said respectable Society'. The money was invested and the income was used to make regular purchases of books which were selected by the Committee of Miscellaneous Matters and were marked by a special bookplate.[17] An important acquisition was recorded in the committee minutes for 1st June, 1801. Nineteen volumes of the *Descriptions des Arts et Métiers*, published by the Royal Academy of Sciences at Paris, were for sale, and the Committee, considering them 'to be very applicable to the views of the Society', agreed to 'recommend to the Society to purchase them at sixteen Guineas, the price they may be now procured at, and to pay for them out of the Moneys arising from the Legacy of the late William Benson Earle Esq'.[18] The Society still possesses six of this valuable series.[19]

The Committee of Miscellaneous Matters was not only charged, under the Society's 'Rules and Orders', with the responsibility of reporting on 'any book


THE SEAL OF THE SOCIETY.
This Book was purchased
in the Year 18
by the Society instituted at
London for the Encouragement
of Arts Manufactures and
Commerce.
pursuant to the Will of
William Benson Earle Esqr.

The book-plate used for purchases made under the William Benson Earle bequest

being purchased for the library of the Society',[20] but it was also, in 1802, asked to draw up the first 'Library Rules' of the Society.[21] These rules, which were adopted by the Society and displayed in the Great Room, were 'that no Member be permitted to have more than either one Folio Volume, one Quarto or two Octavo Volumes at one Time . . . [and] that no Member be permitted to keep any Book longer than fourteen Days'. The Committee instructed the Housekeeper to 'prepare a List or Register of the Books borrowed which shall be laid before the Chairman of this Committee at every meeting thereof in order that it may be seen that the above regulation be properly attended to'.[22] The Committee had little need to fear for the enforcement of these regulations. The Housekeeper was Miss Anna Birch Cockings, who held the office until her death in 1844. Trueman Wood, who had had direct contact with a generation which remembered her well, wrote that 'She was evidently a very remarkable woman, endowed with great force of character. . . . She became eventually, in name as well as in fact, registrar and librarian as well as housekeeper, and . . . she probably did her share even of the secretary's work. Apparently a truculent and masterful old lady, she was an earnest and devoted servant, who was appreciated and esteemed by the masters whom she ruled.'[23] A number of letters in the Society's Loose Archives, for the years 1818 to 1842, contain expressions of respectful apology to this formidable person for having failed to return borrowed books. Most of them plead absence from town as their excuse and give assurance of speedy reparation. She may have been mollified when told by a borrower that he had been 'out of town ever since he had last the pleasure of seeing Miss C.',[24] but can hardly have been pleased to learn that 'the fact is I found five of your notes at my Brother's on my return to Town after an absence of Six months'.[25] Other excuses were that 'by some means it got placed among his own books and was forgotten'[26] and 'begs to return Mahon on Electricity, which he has kept longer than he intended, it having been hid under some papers'.[27] One penitent took refuge in the doctrine of collective culpability—'Compliments to Miss Cockings and is sorry he has so long transgressed the laws, but a *Printed Circular* being sent he is happy to perceive it is not a solitary instance.'[28]

The energy displayed by Miss Cockings in her pursuit of overdue books in the 1820s and 1830s reflects both the growth of her own control over the Society's

Library and the active use which members made of it during those decades. This activity was probably both a cause and an effect of the publication, in 1828, of a second printed catalogue. In 1803 the Society's Committee of Correspondence and Papers had arranged the printing of a replacement for the 1790 edition prepared by a member of the Society, but nothing came of the project.[29] In the spring of 1828 the then Secretary, Arthur Aikin, a distinguished scholar, prepared a further edition.[30] On 4th June, 1828, the Committee of Correspondence and Papers was, in the words of the Society's minutes, 'empowered to print the Catalogue of the Library as prepared by the Secretary', and on 12th November, 'the Secretary announced that the Catalogue of the Library was ready for distribution'.[31]

The opening passage of Aikin's preface to the 1828 catalogue, which begins with the statement that 'The Library of the Society of Arts has been formed partly by purchase, partly by donations', has already been quoted. It has been shown that the element of 'rational amusement' which Aikin mentions was lacking in the 1790 catalogue. In 1828 members of the Society had at their disposal copies of the *Dramatic Works* of Shakespeare and Dryden, and Scott's *Lay of the Last Minstrel* and *Marmion*. But the collection, which had grown to a thousand items, was still largely devoted to what Aikin called 'topics that have a direct reference to the objects of the Society'. His catalogue is much more sophisticated in its arrangement than its 1790 predecessor. He gives the size, place and date of publication of the works he lists, and has an ingenious compromise between an author and a subject arrangement. To quote again from his preface:

> A continued alphabetical catalogue forms the basis, in which *every* book is inserted under the name of the author, or (in the case of anonymous works) under that of the subject: besides which, under the heads Agriculture, Chemistry, Mechanics, etc. are *repeated*, as briefly as possible, the books relating to those several classes.

Aikin continued with an appeal for donations:

> The sums that have been of late years applied to increasing the Library are small; and, considering the various calls on the Society's funds, it is not very likely that they can be augmented: but there is no doubt that the zeal and liberality of individuals may be confidently relied upon in aid of a department, the benefits of which are chiefly enjoyed by the members themselves. An examination of the catalogue, by showing what we have, shews also what we want. If the scientific members of the Society will consider it to be their duty, as far as is consistent with other claims upon them, to fill up the vacancies in the departments of Science, and if the others will contribute works on History and Biography, Geography and Topography, Voyages and Travels, a collection of books will soon be made amply sufficient for the purposes of the Society, as well as for the improvement and rational entertainment of the members and their families.[32]

A serious decline in the revenue and membership of the Society became noticeable in the early 1840s. In 1839 Aikin resigned as secretary after holding the office for twenty-two years, and his successor, W. A. Graham, left in December, 1842, when a committee discovered that the Society could not afford to pay his salary. Miss Cockings died in February, 1844. In November, 1844, the last remaining

stock of the Society, including, it must be supposed, the William Benson Earle Bequest, was sold.[33] There can be little doubt that the Library participated in this general decadence of the Society. In the summer of 1844, it was found necessary to re-arrange the books. A new manuscript catalogue was compiled which contained numerical references to labels which were attached to the books.[34]

The establishment of a governing Council in 1845 marked the beginning of a new period of successful public service and increasing membership for the Society.[35] The Library had little share in this prosperity. The first mention of it in the Council Minutes is the transcription of a letter written in January, 1850. The letter began, 'calling the other day at the Adelphi it struck me that your's was a very good specimen of what a public library ought not to be both as to its contents and their accessibility'. A special Library Committee—the first of a series to bear the name—was set up to inquire into the matter.[36] At the end of the 1850-51 session the Council reported to the Society:

> The condition of the library has for some time occupied the attention of the Council. Up to a certain period its progress appears to have kept up with the scientific and aesthetic literature of the day; but of late years the additions have been only few. Added to this, the arrangement of the books was imperfect, there was no efficient catalogue, and in other ways reference was difficult.
>
> Steps are now being taken for remedying these evils by making the library more complete, especially in the several branches for the encouragement of which the Society exists, and by facilitating the access to and use of the books by the members; and that this reform may not be merely temporary, the new bye-laws make it imperative on the Council at their first meeting to elect a Library Committee.[37]

In 1852 the Council authorized the Library Committee to spend £30 in the Library[38] and in 1856 it 'took into consideration the desirability of putting the Society's Library in a more efficient position'.[39] Nineteen years later, on 14th April, 1875, the great Sir Henry Cole 'called attention to the Library return and to the little use made of the Library, namely that since 1st January, 1875, only seven books were borrowed and six referred to in the Library'.[40] The position in 1879 was described in a report of the Library Committee, approved by the Council and published in the Society's *Journal*. In spite of requests for a new printed catalogue, the Committee found 'The MS. Catalogue at present in use' to be 'sufficient for all purposes of reference'. The report continued:

> The Library is far from complete. It consists mainly of old books, Transactions of Scientific Societies, and Periodical Publications, and a large expenditure of money would be necessary to make it really available for purposes of scientific reference. When there are so many existing libraries in London it has never seemed advisable to the Council to spend largely upon the Library of the Society, but rather to devote to public objects whatever funds the Society had available.[41]

The manuscript catalogue which was found sufficient in 1879 was considered to have 'many fundamental faults' by H. B. Wheatley in a 'Report on the Condition of the Library' which he submitted to the Council in 1881. The Council ultimately yielded to the advice of this eminent bibliographer and in 1887 an expenditure of

up to £25 was allowed for the compilation of a new catalogue.[42] In both 1881 and again in 1885[43] Wheatley described the difficulties of accommodating the stock of 9,000 volumes which was growing each year through the 'annual accumulation of serials'. He also referred to the difficulties of using shelving which 'was not made for the purpose', by which he meant the cases which had been built in 1840 to house the Society's collection of model machines and which disfigured the appearance of the main ground floor room of the Society's house until their removal in 1922.[44] It is difficult for the present generation of members and officers to think of this room as being called anything but the 'Library' or 'Reading Room'. But at least until 1851, which was seventy-seven years after the building of the house, it was called the 'Repository' or 'Model Room', the 'Library' being the name given to the collection of books which were stored in various parts of the Society's House, chiefly, after 1804, in the Committee Room on the first floor.[45] It is probable that soon after the dispersal of the models in 1851 the cases which had been made to hold them were used for storing books and in this way the Library began to occupy its present home. In 1922 the ceiling of the room was again given the support of four columns in the pre-1840 manner, and the modern shelving installed.

In the 1880s, H. B. Wheatley referred to the 'large number of works on International Exhibitions' possessed by the Society.[46] This collection, which has been supplemented in recent years, is the Library's chief legacy from the second half of the nineteenth century. Of particular value are the items connected with the 1851 Exhibition, in the inception of which the Society was so intimately involved.[47] The unique volumes of printed and manuscript materials relating to the origin of the 1851 Exhibition, put together by John Scott Russell, may properly be regarded as part of the Society's Archives, adding, like the other manuscript records, to the richness of the Library but falling outside the story of its development. The same may be said of the Society's publications, which include not only its printed *Transactions* dating from 1783 and its *Journal* from 1852, but some fifty special reports published between 1850 and 1898, which cover a variety of social questions, and are especially valuable for the historian of education. The Society's own efforts to promote the development of the public library system of this country also fall outside the scope of this paper.[48]

When describing the difficulties which faced the Society during the 1939-1945 war, the authors of the most recent history of the Society wrote that 'even the wartime period made its contribution of progress to the internal affairs of the Society'. They were referring to the decision taken by the Council in 1943, when many of the more valuable books were stored in Aberystwyth and Warwickshire, 'that, as soon as circumstances permitted and the books had returned to their shelves, the library should be reorganized and a full-time staff appointed'.[49] The organization of the Library in its present form stems from this decision. In 1947 Mr. J. G. Wilson, then as now a member of the Library Committee, consulted with Mr. Lionel McColvin and Mr. L. J. F. Brimble, and it was agreed that 'the only specialized subject appropriate to this Society which is not already fully covered by other libraries is the encouragement of arts, manufactures and commerce and the influence of the public mind in all arts and sciences'. Early in the following

year, 1948, the first appointment of a permanent Librarian, Mr. K. D. C. Vernon, was made and the Council began a series of annual financial allocations for book buying and rebinding which still continue. These enabled Mr. Vernon, and after 1950 his successor Miss M. L. Clark, to build up the modern section of the Library and to maintain and improve the 'early works' and the exhibitions section. Also in 1948, the Library became an 'outlier' library of the National Central Library and members of the Society were allowed to draw on the resources of a wide range of public, special and university libraries which could, in their turn, borrow from the Society's collections.

A printed catalogue of the modern section which listed approximately 1,800 items was published in 1953, but it was already out of date when it appeared. Additions to the Library since it was compiled exceed 3,500 books, and there has been an increasing emphasis on specialized works relating to industrial design, and to the history of art and architecture, subjects which are particularly popular amongst members of the Society. In recent years the Library has benefited from a number of gifts and bequests. Details of these may be found in the annual reports of the Council and the lists of additions to the Library, both of which are printed in the *Journal*. The bequests connected with the late F. H. Andrews, who—among many other services as a Library Committee member—designed the Library's present bookplate, deserve a particular mention. In 1956 his daughter, Mrs. Norah W. Michael, left £1,000 to the Society, in association with the name of her father. The annual interest from her bequest was to be devoted to Library purposes. The year after (1957) Mr. Andrews himself died and left the Society a choice of any works from his personal library. Among those selected were the six splendid volumes of *The Survey of Persian Art* (1938).

It may be regretted that from the middle of the last century until the relatively recent past the Library was a neglected aspect of the Society's work. On the other hand, the Society can be given credit for putting its public objects above the immediate convenience of its members. In any case a large collection of late-Victorian scientific works—which is probably the sort of library which would have been built up had the Council provided the necessary funds—would have been of little use to the Society to-day. The loss of a considerable part of the pre-1828 collection will always be felt; but fortunately, at least one third remains. By caring for this collection, which documents a unique phase in English social and economic development, the Society may surely claim to be both serving itself and the nation at large by an enrichment of their common heritage.

REFERENCES

1. R.S.A., Society Minutes (hereafter Soc. Min.), 22nd March, 1754.
2. Sir H. Trueman Wood, *The History of the Royal Society of Arts*, London, 1913 (hereafter Trueman Wood), p. 45.
3. Soc. Min., 26th March, 1755; D. Hudson and K. W. Luckhurst, *The Royal Society of Arts, 1754-1954*, London, 1954 (hereafter Hudson and Luckhurst), p. 87.
4. Soc. Min., 1st Oct., 1755.
5. Ibid., 26th Nov., 1755. It may be assumed to be the 1733 printing as listed in the Society's 1828 Catalogue (see below, note 8). The first edition of *The New Horse-Houghing Husbandry, or an Essay on the Principles of Tillage and Vegetation*, was published in 1731. See G. E. Fussell, *More Old English Farming Books* (London, 1950), p. 4.

6. Soc. Min., 3rd March, 1756.
7. R.S.A., Ledger, 1755-66, p. 77a. The Society's 1828 Catalogue lists the seventh edition (1759) and this is still in the Society's possession.
8. *Catalogue of the Library of the Society for the Encouragement of Arts, Manufactures, and Commerce* (London, 1828), p. iii. (Hereafter 1828 *Catalogue*.)
9. R.S.A., MS. Transactions (hereafter MS. Trans.), 1770-71, pp. 99, 102, 103, 106; 1771-2, pp. 57, 58, 59, 62; 1772-3, pp. 45, 60, 63, 66, 67, 69, 70; 1773-4, pp. 96, 97; 1774-5, pp. 119, 120; 1779-80, pp. 31, 32; 1781-2, pp. 17, 19, 20. The MS. Trans. for 1775-6 are not extant. For gifts of books during this period see Soc. Min.
10. MS. Trans., 1779-80, p. 31; S. Pargellis and D. J. Medley, *Bibliography of British History, the eighteenth century*, 1714-1789 (Oxford, 1951); H. G. Gazeby, 'Arthur Young and the Society of Arts': *Journal of Economic History*, Vol. I, No. 2 (1941) pp. 129-52.
11. MS. Trans., loc. cit.; it was presumably the second edition, published in 1779, which was presented at that date, although the 1828 *Catalogue* lists the 1775 (1st) edition, which the Society still has, but gives the title of the second. The 1790 *Catalogue* lists the 1st and 2nd editions. See also 'Joshua Steele, elected in 1756': *Journal*, Vol. CIV (1956), pp. 357-8.
12. *Transactions of the Society of Arts*, Vol. III (1785), p. 97; The first volume of the printed Transactions had appeared in 1783.
13. Minutes of the Committee of Miscellaneous Matters (hereafter Min. Comm. Misc.), 22nd Feb., 1779.
14. R.S.A. Loose Archives (hereafter L.A.), C6/46. J. Downes, 1794.
15. Soc. Min., 22nd Oct., 1794.
16. Min. Comm. Misc., 22nd Nov., 1791.
17. *Transactions*, Vol. XV (1797), pp. iii-iv; Min. Comm. Misc., 7th Nov., 1797. In 1805 the other committees of the Society were also empowered to make recommendations on book purchases (Soc. Min., 6th Feb., 1805).
18. Min. Comm. Misc., 1st June, 1801.
19. Fougeroux de Bondaroy, *Art de travailler les cuirs dorés ou argentés* (Paris, 1762), *Art de tirer des carrières la Pierre d'Ardoise, de la fendre et de la tailler* (Paris, 1763), *Art du Tonnelier* (Paris, 1763); De Reamur, *Art de faire éclorre et d'élever en toute saison des oiseaux domestiques de toutes espèce* (Paris, 1751); Duhamel du Monceau, *Art de la draperie, principalement pour ce qui regarde des draps fins* (Paris, 1765); *Traité de la fabrique des manœuvres pour les vaisseaux, ou l'art de la corderie perfectionné* (Paris, 1747).
20. *Rules and Orders of the Society* (London, 1802), p. 29.
21. Soc. Min., 21st Dec., 1802.
22. Min. Comm. Misc., 21st Dec., 1802, and 1st Feb., 1803.
23. Trueman Wood, pp. 342-3.
24. L.A., D13/28, R. Wolseley (1830?).
25. Ibid., D5/9, H. Moss, 1820.
26. Ibid., D5/3, W. Forty, 1827.
27. Ibid., D13/14, E. Gandy, 1834.
28. Ibid., F1/336, H. Wilkinson, 1834. See also D3/1, de Lassau (1818?); D3/56, D. Stable, 1818; D5/5, H. Crawter (1820?); D7/206, R. Hendrie (1820?); D13/1-3, H. Ward, 1820; D5/4, R. Kepp, 1820; D5/6, W. Trery, 1822; D5/8, G. Cooper, 1822; D5/7, S. Lake, 1822; D5/1, 11-13, A. Greig, 1824-5; D5/2, Paget, 1826; D13/6, J. Bacon, 1826; D5/15, W. Gifford, 1827; D5/10, W. Browne, 1827; D13/7, J. Jones, 1830; D13/5, H. Adcock (1830?); D13/9, J. Pile, 1832; F1/334, T. W. Pike, 1833; F1/343, C. Copland, 1837.
29. Min. Comm. Correspondence and Papers, 14th Nov., 1803.
30. For Aikin see B. Rodgers, *Georgian Chronicle, Mrs. Barbauld and her family* (London, 1959).
31. Soc. Min., 4th June and 12th Nov., 1828. See also Min. Comm. Correspondence and Papers, 6th, 13th and 27th Oct., 3rd Nov., 1828.
32. 1828 *Catalogue*, pp. iii-iv.
33. Trueman Wood, p. 345; S. T. Davenport, *The Society of Arts, past and present* (London, 1869), pp. 3-4.
34. Min. Comm. Misc., 19th June, 2nd Oct., 1844.
35. Hudson and Luckhurst, p. 364.
36. Council Min., 16th Jan., 1850.
37. *Transactions*, Vol. LVII (1851) pp. xvii-xviii.
38. Council Min., 6th March and 26th May, 1852.
39. Ibid., 19th March, 1856.
40. Ibid., 19th April, 1875. For Cole and the Society see Hudson and Luckhurst, pp. 182, 191, *et seqq*.

41. *Journal*, Vol. XXVII (1879), p. 715.
42. Council Min., 28th Feb., 1881; 4th April, 1887. Wheatley reported that he had 'gone over the Library shelf by shelf'. For Wheatley and the Society see Hudson and Luckhurst, pp. 361-2.
43. Council Min., 1st Nov., 1885.
44. *Journal*, Vol. LXXI (1923), p. 264.
45. In 1804 a recommendation of the Committee of Miscellaneous Matters 'that all the printed books of the Society be arranged in the Committee Room' was approved by the Society (Min. Comm. Misc., 13th March, 1804; Soc. Min., 14th March, 1814). For a reference to books being marked with distinguishing labels to show in which rooms they were usually kept, see Min. Comm. Misc., 17th July, 1844.
46. Council Min., 28th Feb., 1881.
47. Hudson and Luckhurst, p. 187, *et seqq.*
48. For a list of the reports see ibid., pp. 379-83. For the Society's Archives see *Journal*, Vol. CVI (1958), pp. 623-9. For the Society and the public library movement see ibid., Vols. I (1853), II (1854), III (1855), VII (1859), XVII (1869).
49. Hudson and Luckhurst, p. 370. See also *Journal*, Vol. XCVI (1948), p. 500.

GENERAL NOTES

THREE YEARS OF THE CIVIC TRUST

When Mr. Duncan Sandys founded the Civic Trust three years ago many of us wondered just what its function could be amid the societies for preservation of this and that amenity, the professional institutes, and benevolent Government departments. Was it going to be another preservative? or something more active? The report entitled *The First Three Years* is the answer, and a hopeful if not as yet complete answer.

After foundation the Trust first made its contacts with the local authorities' departments, organizations and societies within its field in a very practical manner, offering itself as a supporter and adviser on matters of civic amenity. It then launched into practical experiment by taking over a decayed street in Norwich and transforming it from being the sort of frowsty street we know so well—not derelict, not bankrupt at all, but with no feeling of unity or belonging, a lot of individual properties asserting themselves in a half-hearted and generally tasteless way, with the chance of their getting worse, not better—it transformed this into something approaching a unified conception of a street, gay, charming and much more self-respecting. It then went on to repeat the experiment elsewhere, and the idea spread to other towns.

Its next experiment was suggested to it by Cambridge undergraduates and took the form of destroying eyesores on the face of beautiful landscape, initially of wartime works on a stretch of Pembrokeshire Coast. This too has been repeated elsewhere.

Neither of these experiments takes us far along the road, but because they are healthy reactions to a bad state of affairs I find them positive and useful. We complain of the state of our towns, and of their shopping streets particularly, and if we do nothing about it then our state is worse confounded; but if we do something, then there is hope for us, is there not?

The next venture of the Trust, which was to back with all its powers the opposition to the Monico site development in Piccadilly Circus, was both positive, courageous, and in the event decisive. The successful outcome of that momentous inquiry owed nearly everything to the Civic Trust, for while the architects were willing, the Trust was both willing and able.

And this brought the Trust to the centre of the urban problem. Magdalen Street, Norwich, was in process of disintegration before the Trust came along and gave it a face-lift, but the disintegration of the towns is widespread and deep-seated, and is both physical and moral.

We have seen that re-integration is not answerable to a take-over bid. The problems are too urgent and complex, the needs of the people for emotional outlet too long

starved and warped to do anything less than search for and discover the true impulses of urban renewal. It is that task that I should like to see tackled by the Trust along with any other bodies that will join with it. How we are to live in towns in the second half of this century seems to me to be about as important a question as needs answering by this generation; and the Trust, having shown both imagination and courage, could well take the lead in answering it.

E. MAXWELL FRY

'THE AGE OF CHARLES II', AT THE ROYAL ACADEMY

It is not the least of the duties of a Royal and historic Society to revive the past, quickening an age's life and manners with palpable actuality. Both in lectures and exhibitions, this Society has striven for generations to accomplish just that. In the tercentary celebration of the Restoration, at a moment when this Society looks forward keenly to the address of Mr. Oliver Millar, it is heartening to welcome the Royal Academy's winter exhibition of *The Age of Charles II* which our lecturer, the leading authority on Stuart art, has planned and catalogued with equal zest and scholarship. The occasion has also been taken to commemorate at Burlington House the early achievements of the Royal Society whose members, dispersed by the Civil War, renewed their London meetings after the Restoration, receiving their Royal Charter in 1662 for the promotion of natural knowledge.

Of the insatiable curiosity of the age we are reminded here in all manner of globes, calculators, and scientific instruments, including Newton's own reflecting telescope. These pioneers in experimental science, members of the King's most enduring creation, are enshrined in Gallery V. Yet one realizes how much of that time's fervent spirit must remain untrapped by any exhibition. In 1675 the Royal Observatory was founded at Greenwich. In the City Wren was giving his steepled grace to the skyline, and scheming much else of importance. And as the mind's eye takes in the period's architecture, which is so much more exuberant than its painting, so the ear receives again the airs of Purcell, the sound of Milton's last poems and the prose of Bunyan. There is, of course, very much to be said for this manageable collection of paintings and the decorative arts, skilfully diversified and confined to the central and western galleries of the Academy; but an equally strong case could be made, no doubt, for a room at least of manuscripts and architectural prints.

The truth is that almost every painter of the second Charles's reign was a capable sobersides, apt to borrow the rhetorical mannerisms of Van Dyck without approaching his innate sensitiveness and refinement. That makes for dullness, especially in the preponderance of later Stuart portraiture containing over sixty productions from Lely alone. The Academy cheats a little, and understandably, by opening in fact with the childhood of Charles I and Van Dyck's portraiture. To turn from the aristocracy of feeling and handling of the *Sir Thomas Hanmer* portrait (one of the best Van Dyck ever painted, as Evelyn rightly noted) to the fashionable practice of Lely is not encouraging. Seldom are his sitters clearly individualized. One refutes Roger Fry's opinion that at least Lely understood the principles of design and used them with assurance. In fact, Lely's double portrait of Charles I with his son James hardly holds together, while the larger group of the Martyr's children brings out again the inadequacy of anything more assuming than the vapid elegance of his single beauties, whether courtier or courtesan. Unquestionably Kneller was the more ambitious, breaking away from the Van Dyckian conventions which in Lely's hands appear almost mechanical. Kneller's portrait of Evelyn, painted for Pepys, is a fine thinking likeness, and in his robust full-length of the Duchess of Portsmouth before a curtain drawn back by a Negro page, he anticipates Reynolds.

Even so, as often happens in these large period exhibitions, it is the surprises that stay most vividly in the mind's eye. Michael Wright, for example, itinerant Scot, Roman convert and self-styled *Pictor Regius*, emerges as a painter more various and interesting than the insignificant figure he is usually accounted. Wright's formal

composition of Charles II in robes and with the regalia is a curiously impressive and austere image of restored monarchy, far removed from the unctuous religiosity of the time. His three-quarter length of *Colonel John Russell* (from Ham House) is another arresting portrait in russet and ivory hues; and the diversity and honesty of Wright's approach elsewhere so far relieve the eye as to excuse his weaknesses. Students of painting will also remark the queer immediacy of Goddard Dunning's likeness of Charles I, melancholy tingeing the disdainful features which are given an almost Stanley Spencerish sheen, and represented here in his execution clothes; and note again, in very different mood, the fresh and lively candour of Simon Verelst's presentment of Nell Gwynn bared to her alabaster waist.

It would be tedious to enumerate all the capable painters who flowed in with the King's restoration. Best of all, after his exile, Charles enlisted Samuel Cooper, the leading miniaturist in Europe. His appeal is to the student of personality rather than to the poet; the ethereal graces of Hilliard are not his. With Cooper's high bred, Venetian tinged art (which owes nothing to French influence) went a penetrating sense of the characters of all his Court and Commonwealth sitters, never before so fully assembled. Examples have been lent by the Queen, by Queen Juliana of the Netherlands and the Mauritshuis collection to show both the searching nature of the gift which Pepys so admired as well as Cooper's understanding when to leave a sketchy excellence alone.

All this is relieved by an infusion of marine pieces, strict views of English houses, and of the gleaming, turreted Thames-side. There are contemporary paintings of the fire of London and of the great freeze on the Thames. Most splendidly is the exhibition enriched by the craftsmanship of the period's plate and furnishings—ornate walnut chairs, the fine 'oyster piece' veneers and marquetry, backed by triumphal Mortlake tapestries. Clocks chime softly all through the galleries. Really, a foreigner might decide that the English take their revolutions as ceremoniously as their sports. That may well be a tribute to the discretion of the King who, if he lacked the rare refinement of his father's connoisseurship, was sufficient master of other arts to guide his ship through all the perils of the Popish plot. It is fitting that the last relic in the exhibition should be the waxen effigy of Charles II in his brittle Garter robes, doubtless carried at his funeral and now from Westminster Abbey to say Amen to this Stuart procession.

NEVILE WALLIS

NEW DIPLOMA IN ART AND DESIGN

In January, 1959, the Minister of Education (then Mr. Geoffrey Lloyd) appointed a Council, under the Chairmanship of Sir William Coldstream, to advise him on all aspects of art in further education. There has now been published *The First Report of the National Advisory Council on Art Education* (H.M.S.O., 1*s.* 6*d.* net), which recommends some major changes in the structure of advanced courses in art education and the introduction of a new 'Diploma in Art and Design' (Dip.A.D.) of a higher standard than the present National Diploma in Design. The new system will take the place of the art examinations for long administered by the Ministry of Education. The present Minister, Sir David Eccles, has welcomed the report and in accordance with its recommendations has decided:

(1) to set up an independent body to be known as the 'National Council for Awards in Art and Design', with responsibility for approving the academic standards of courses and for examination arrangements;

(2) to announce, as soon as possible, the starting date for the courses and examinations and the dates of the last Ministry of Education examinations (it is envisaged that the aerliest possible date for the start of the new courses will be 1963);

(3) to allocate sufficient resources in the 1963-4 further education building programme, and in subsequent programmes, for improvements to be made at the colleges and schools running the new diploma courses.

In the existing N.D.D. system a student specializes in one or two subjects and obtains a diploma on this basis. Outlining the principles on which the courses for the new diploma should be constructed, the National Advisory Council recommend that 'the aim should be to produce courses conceived as a liberal education in art, in which specialization should be related to one of a small number of broad areas, or, to put it another way, that a subject that is principally emphasized should always be studied in a broad context'. The Council believe that there should be four such broad areas of specialization: Fine Art; Graphic Design; Three-Dimensional Design, and Textiles/Fashion. They emphasize that the history of art should be studied throughout a course and be examined for the diploma.

It is agreed in the Report that the new courses should approximate in standard to a university course of the same length (three years full time) leading to a first degree. The normal age of entry should not be less than 18 years, and entrants should already have completed a pre-diploma course of at least one academic year. They should also be required to produce evidence of ability in art, and to have reached a 'good standard' in general education. Although an escape clause is provided for the gifted student who is 'temperamentally allergic to conventional education', the report recommends that as a general rule this standard should enjoin five 'O' level passes in the G.C.E. (or the equivalent in terms of combined 'O' level and 'A' level passes). It is also urged that of the five 'O' level passes at least three should be in academic subjects, and at least one a subject providing evidence of the candidate's ability to use English.

It is recognized as desirable, however, that there should be an interim period of three or four years from the date on which the new diploma courses are introduced so that potential students, secondary schools and schools of art may adjust themselves to the new educational requirements.

I.J.

THE EDUCATIONAL FILM CENTRE

A new organization, the Educational Film Centre Limited, has just been founded. Its directors are Maurice Goldsmith, formerly Science Editor at U.N.E.S.C.O., and publisher of scientific journals for use in schools, John Halas and Joy Batchelor, the animation film producers, and Roger Manvell, author and script-writer, formerly Director of the British Film Academy.

The objects of the Centre include promoting the production of educational (especially science-teaching) films, the sponsorship of research into the most useful forms and techniques for instructional films and their best use in the classroom, and the publication of pamphlets and film-strips associated with the films produced and with the research projects undertaken by the Centre. The Centre is in close consultation with the Educational Foundation for Visual Aids, and also with the organizations concerned with the presentation of science and the arts.

The directors of the Centre believe that the initial aim should be the production of a carefully planned series of science-teaching films designed specifically for use in secondary modern schools. These films will be made in collaboration with representatives from the science teachers' associations, who have already undertaken to give advice and help.

The address of this new organization is Lysbeth House, 10A Soho Square, London, W.1.

STUDIES IN THE SOCIETY'S ARCHIVES XVI

A Campaign to Promote the Prosperity of Colonial Virginia (iii)*

The Society of Arts encouraged the colony to diversify its economy. In 1761 Wyche

* Reproduced from *The Virginia Magazine of History and Biography*, Vol. LXVII, No. 4 (1959), by kind permission of the Editor. Parts (i) and (ii) appeared in the *Journal* for November, 1960, and December, 1960, respectively.

informed Carter that the membership of the Society was composed of not less than 2000 of the nobility and gentry, whose actual subscription amounted to 4,000 guineas to be given for the advancement and encouragement of all things that 'promote the Grandeur and Welfare of England'.[1] It was especially interested in encouraging in Virginia the production of wines, hemp, fisheries and fish oil, saltpetre and potash. Interest was also shown in Carter's white tar and in foreign grapes, roots, plants or herbs that would vegetate in England, as turnips did, for the first four months of the year, thus furnishing additional green feed for the livestock.

Concerning wines, Carter's winter grape wine aroused the most speculation among members of the Society, none of whom had ever heard of such a variety. Some thought it was a sweet wine. Others were of the opinion that it must be of the Rhenish sort. Wyche believed a good market could be found in England, if it were of the latter kind, for German wines were in vogue there.

He reminded Carter that the French used their inferior grapes for making brandy and wondered if it would not be wise for Virginia to pursue the same policy. More money could be kept in the colony, he pointed out, if the Virginians would use a native brandy as a substitute for rum and arrack. Surely the slaves could be supplied more cheaply with an inferior native brandy than with foreign rum.

Wyche did not want Carter to conclude from his correspondence that he was 'an advocate for spiritous Liquors'. They should be used only in cases of necessity. 'The Abuse of them', he declared, 'is much to be Condemned and Not to be tolerated in any Kingdom whatever'.

Returning to the grape culture later, Wyche declared that the planting of European grapes in America was once suggested by Mr. Miller (possibly Philip Miller, the author of the *Gardener's Dictionary*). Wyche had never heard whether it had succeeded, and believed it had failed 'because they farmed their vineyards in the European manner'. Since French grapes grew in the latitude of 46 to 47 degrees and Virginia was situated 10 degrees farther south, the heat of Virginia was considerably greater and must have altered the nature of the wine, as in the case of the wines of the Cape of Good Hope. (The grapes growing in the Cape of Good Hope had originally been brought from Burgundy and Champagne.) Besides, Virginia was flat and the soil rich, two conditions bad for wine grapes.

Wyche suggested that the vine would probably thrive better in Virginia if it were allowed to grow into a tree, for the tree top would protect it with a canopy from drought and violent heavy rains, which would burst the fruit if the European form of stake-vineyards was used. It was known in time of great drought, he said, that the vine would feed on the juice of its own grapes so hastily, if it was cut back, that it drew the juice from the grapes and no wine could be then made from them. If orange and lime trees grew in Virginia, as he had been informed, they could be used to provide a canopy, since there was nothing noxious to the vine in the effluvia of those trees. If those trees were not available, the Virginians should search the woods for the trees the vine naturally sought for itself.

Wyche promised to send to Virginia at the proper season cuttings of the Burgundy, Champagne, Claret and Spanish grapes. He had already shipped to Alexander Garden,[2] of South Carolina, the famous botanist (not the minister of that name), slips of the Zant and Tokay grapes. Wyche had been advised that they had arrived safely and in a vegetating condition. Furthermore, he had spoken to a Mr. Forrester for some of the Zant grapes from Piedmont, for he had found it was high treason to obtain cuttings from Zant itself. These cuttings he would send as soon as convenient. Mr. Frye, a gentleman from Antigua, had informed him that the grapes of Antigua were better than those of Spain and that cuttings could be obtained from that island without difficulty. Wyche therefore suggested that Carter might order them directly, thus saving time.

In 1762 Carter wrote that he had 1,800 vines in his vineyard but doubted if he

would make more than one hogshead of wine because of the severity of the summer drought.[3] Like his contemporaries, he did not know that certain parasites in eastern North America were destroying the roots of the European grape vines.[4]

In 1763 Wyche proposed ingrafting to the Virginians as a means of improving their native grapes (as well as their peaches and wild olives). He explained in detail how the grafting was done with grafts taken from the vine itself and grafted upon the same individual vine from which they were taken, an operation that would have to be repeated with the grafted portions of the vine three years before the grapes would reach a high quality. According to Columella, this method of improving grapes had been used as early as two thousand years before, Wyche reminded them. He also stated that Colonel Colleton, owner of a large plantation in Carolina, claimed that he had found a good wine grape there, which may have been Wyche's way of hinting that the Virginians might use it for ingrafting. Possibly Colleton's variety was the scuppernong, though one cannot be certain.

Wyche was offering sound advice to the Virginians when he recommended ingrafting. Many improvements in grapes and other fruits have been made by the use of this process. Had he proposed cross-grafting of the grape vines of Europe on American stocks, which were resistant to indigenous root parasites, a wine industry might have been started in colonial Virginia. From native wild northern fox grapes eventually came the Concord, Eaton, Moore's Early, and Worden grapes. The European grape ultimately entered into the production of many American hybrids, such as Delaware, Catawba, Brighton, and Niagara. The summer grape that grows wild from Virginia southward has been developed into popular varieties for wine making, such as Cynthiana and Norton. Muscadine grapes, which also are native to the south-eastern States, have proved resistant to disease and are vigorous growers.

Wyche discussed, moreover, methods of clearing wine. The lees in wine could be precipitated by pouring brandy in it, by cooling it either in a cellar or with salt, or by throwing wood shavings and sawdust into the cask, which was the method used by the French in clearing Burgundy so that it could be sold for old wine within a few months, if mixed with a wine of superior age.[5]

Despite all these efforts, Virginians exported to Great Britain in the fiscal year of 1768 only 13 tons and 135 gallons of wine, certainly not a very impressive quantity. In the same year, Virginians imported 396,580 gallons of rum from overseas and an additional 78,264 gallons from North American colonies.[6]

As for hemp, the Society of Arts allotted £700 to be bestowed on those who cultivated it in America. Wyche thought all the hemp the Colonies could produce would be used in New England, where shipbuilding was 'very great'. Even though none was directly shipped to England, the whole empire would benefit, he reasoned, because an increase in the supply anywhere in the empire would help to free the British navy from its dependence upon Russian hemp. It was computed, he stated, that Britain was paying Russia £740,000 annually for hemp and other naval stores. Therefore the Society had also granted £500 to encourage the growth of hemp in the United Kingdom. No Englishman could approve of the British fleet's being under the control of a Russian monarch, he said. The English had already seen too much of that condition during the conflict in progress—the French and Indian War.[7] Despite Wyche's prediction that America would produce no hemp for exportation, Virginia did later export some hemp to Great Britain—212 tons in 1768 for instance.[8]

Wyche presumed that the hemp in America, like that in England, had originally come from Russia. He described the English variety as growing to a height of six feet, adding that the Society intended to try to improve it by obtaining seeds of a species that grew to twelve feet in Lombardy.

In Wyche's opinion, the export of herring and other fish taken along the coast of Virginia might be made the basis for a profitable trade with the West Indies. Besides, the oil of such fish should be of great usefulness in Virginia if a process could be

devised of 'edulcorating' it. Carter would be sent an authentic account of an experiment the Society was conducting along these lines, if it made a useful discovery. Perhaps fish oil would become highly important to staple manufacturers and a useful illuminating fuel for the lamps of Virginia.

The fishing industry of Virginia did not become an immediate success. In the fiscal year 1768 only 54 kegs and 465 barrels of fish (pickled) were exported, all to the British and foreign West Indies. No mention was made of fish oil.[9]

Concerning saltpetre, Wyche declared that a premium of £200 had been advertised to encourage its manufacture. A saltpetre plant erected in Chelsea at considerable cost was not furnishing a sufficient quantity. Besides, its price was too high. Britain's main supply of the commodity was still being imported at an excessively high rate from Bengal by the East India Company, which was under a contract with the British Government to keep the latter supplied. In Wyche's opinion, the company desired to get rid of its contract and the Government wanted to obtain its saltpetre *at less cost.*[10]

In 1762 Carter sent Wyche a sample of saltpetre made in Virginia by an illiterate, poverty-stricken old man named Jeremiah Brown, who had been developing his process for ten years, whenever he could spare the time from the daily labour required to maintain his large family. Because of his poverty, Brown had used only two or three pots and a few dishes. Yet he had extracted small crystal shoots of saltpetre, 'the Size of Tobacco Pipe stems', from the sources available in Virginia. Carter claimed the sources were the litter from 'any Houses used for Tobacco, Horses & Cattle. . . . All north sides of Hills & old worn out lands covered with Bushes'. A small quantity of this saltpetre made all sorts of fish 'as red as salmon'. It also burned well, according to Carter, who urged the Society to set Brown up in business by giving him needed financial support.

William Lewis, the distinguished chemist, and Samuel More, who was to become Secretary of the Society in 1769, tested the Virginia saltpetre and reported their findings to the Society. Lewis conducted nine experiments and came to the conclusion 'That greatest part of the Virginia salt is perfect nitre, or composed of nitrous acid and vegetable alcali; That it contains also a considerable quantity of a salt, composed of the same acid and some other basis, in part earthy, but not calcarous: and that great part of this heterogene salt, but not the whole, becomes nitre on being supplied with a vegetable alcaline basis'.

Lewis's descriptive expression, 'composed of nitrous acid and vegetable alcali', would be expressed in modern chemical terminology as potassium nitrate (KNO^3), which is the original saltpetre used in gunpowder. By experimentation he found that it exploded well when mixed with charcoal in the proportions of ten to three and in other proportions also. He eliminated the possibility of the compound being the 'mineral alcali'—that is, sodium nitrate ($NaNO_3$)—by burning it. It did not 'yield a yellow flame'. By adding a filtered solution of chalk to pure *aqua fortis* (nitric acid) and mixing them with a filtered solution of Virginia nitre he determined that the Virginia salt contained no 'vitriolated tartar', for the whole mixture remained limpid, without the least cloudiness. By adding vitriol (sulphuric acid) to a filtered solution of the nitre, he tested for a 'calcarious' or calcium base. Had calcium been present it would have combined with the vitriol and precipitated as a salt. Instead, the solution became only slightly cloudy, which Lewis attributed to the extraneous substance in the saltpetre. Lewis also detected evidence of such a substance as a residue after the burning or exploding of the saltpetre. Because of an insufficient supply he did not attempt to determine the percentage of pure nitre in the mixture.[12]

More's experiments consisted mainly of comparing the Virginia saltpetre with the common saltpetre of England. He found it was equal to the English saltpetre in quality and that the gunpowder he made with it in the proportions of 18 of nitre, 3 of powdered charcoal and 3 of sulphur, was as good as gunpowder he made when

English nitrate was substituted. Neither, however, was as good as manufactured gunpowder, a fact which More attributed to the superiority of mixing in the factory rather than any inferiority in the saltpetre.[13]

The Society of Arts shared with the Virginia Committee the information it obtained when it revived the use of 'the obsolete Chemical Fluid of Mr. Ambrose Godfrey for the speedy extinction of fires either in Houses or on Board of Ships by Suffocation & Explosion'. An experiment in this method of fire-fighting was carried on successfully in the presence of some of the royal family and a huge crowd in Marylebone Fields on 19th May, 1761. The Society ordered a pamphlet to be prepared on the subject for distribution and promised to send a copy to Carter.[14]

After seeing a published list of the bounties offered by the Society, Charles Dick, a Virginian, sought to claim a premium by submitting a record which showed that he had shipped a total of 133 casks and 10 hogsheads of pearl ash from Fredericksburg to England via named vessels between 1757 and 1761 inclusive. He *stated that he had* manufactured it at a great expense and with difficulty.[15] He thought potash could be made in large quantities, but the method was not generally known in Virginia. Proper equipment was not always available, and the planters were often not interested in saving and selling their wood ashes. Dick then described a process of manufacture which he could use if he could only obtain a copper ladle and an iron rod a little longer than the depth of the iron pot, and flattened at one end in the manner of a broad chisel for scraping frequently the bottom of the pot when the lye began to thicken.

Dick felt that some real progress was being made in the production of hemp and the manufacture of cordage. He took a dim view of the progress in wine-making, but believed that profitable vineyards could be cultivated upon the mountain-sides and limestone lands of Virginia. Silk was raised only by a few people as a curiosity. Sturgeons abounded but a good receipt for pickling them was needed; also a market. The planters had no raisin grapes or olive trees with which to experiment. Scammony and opium poppies should also be sent for a trial. He claimed that abundant cobalt deposits existed in the back country of Virginia but that they were too far from means of navigation for the ore to be brought to market.[16]

Certainly the correspondence between the Society and the Virginia Committee helped to promote economic diversification in Virginia, even though none of the projects discussed ever developed into a major crop or dominant industry of the colony. Hemp and cordage became important. Significant experiments were undertaken in the making of pearl ash and saltpetre. A greater knowledge was obtained about grapes and their culture. It was realized more fully that the development of the fisheries depended upon a better quality of salt, better methods of pickling, an improved process for refining the fish oil, and a good market. Improvements in the manufacture of tar were worth seeking. The medicinal qualities of herbs needed further investigation. It became more apparent that the silk industry and certain other proposed undertakings would fail.

In 1763 the Society awarded a gold medal to Carter 'for care and industry to promote in Virginia the purposes of this Society in the British colonies'.[17] Such recognition had its disadvantages, however. In June of the same year, after Governor Fauquier and Colonel Thornton had been appointed to the Committee to fill vacancies, a letter was read from Wyche in which Charles Carter 'was the Heroe'. This caused so much jealousy in the Committee according to Charles's letter to his brother, Landon, that 'they did not take any notice of the Honour done them by the society and all my endeavours were little regarded. Colo. Thornton and Colo. Tayloe can inform you that I shalt for the Future give them very little trouble and carry on the whole correspondence myself. They did not vouchsafe to give me any instructions'.[18]

Indirectly, the correspondence may have kept the attention of the planters more constantly focused upon the need for economic diversification along lines that were more readily available. Many planters, including George Washington and Robert

Carter of Nomini Hall, turned to wheat, corn, peas and beans, and livestock, as their chief money crop after the French and Indian War. In 1768 Virginia exported overseas over 500,000 bushels of corn, nearly 45,000 bushels of peas and beans, nearly 15,000 barrels of bread and flour, more than 130,000 bushels of wheat, approximately 7,200 barrels of beef, pork, and hams, 13,255 bushels of oats, and 2,700 pounds of indigo. Lumbering and wood products were also important, with overseas exports in 1768 being in excess of 105,000 hoops, at least 15,000 feet of oars, more than 615,000 feet of plank and scantling (not including over 52,000 feet of timber pine), and 23,333 barrels of pitch, tar and turpentine. The iron industry was also on the march, with an exportation of 585 tons of iron bars and 854 tons of pig iron. Only about 42,000 hogsheads of tobacco were exported, well below the nearly 60,000 hogsheads Carter estimated as having been exported annually eight years earlier.[19] But, despite progress in diversification, Virginia's exportation of tobacco exceeded 60,000 hogsheads in the early 1770s: 65,208 hogsheads were exported in the fiscal year between 25th October, 1771 and 25th October, 1772, and 69,587 hogsheads were shipped in the following fiscal year.[20] Tobacco alone represented over 75 per cent of the total value of goods exported from Virginia and Maryland in 1775.[21]

ROBERT LEROY HILLDRUP*

1. R.S.A., Guard Books (hereafter G.B.), Vol. VI, No. 49. P. Wyche, 30th May, 1761. Wyche's figures were an exaggeration. The Society had less than 1,500 members in 1761 (see D. Hudson and K. W. Luckhurst, *The Royal Society of Arts, 1754-1954*, p. 364). Its income from subscriptions was £3,656 4s. (MS. Ledger, 1755-66).

2. Donald C. Peattie, 'Alexander Garden': *Dictionary of American Biography*, Vol. VII (New York, 1931), pp. 132-3.

3. G.B., Vol. VII, No. 116. C. Carter, 21st Aug., 1762.

4. Conway Zirkle, 'John Clayton and Our Colonial Botany': *Virginia Magazine of History and Biography*, Vol. LXVII (1959), p. 288.

5. University of Virginia Library, Sabine Hall Papers. Extract of Peter Wyche's letter to Colonel Charles Carter, Aug., 1763 ; Fred Coleman Sears, *Productive Small Fruit Culture* (Philadelphia, 1920), pp. 279-90.

6. Sheffield Central Library, the Wentworth-Woodhouse Muniments, No. R61-6.

7. G.B., Vol. VI, No. 49, P. Wyche, 30th May, 1761.

8. Wentworth-Woodhouse Muniments, loc. cit.

9. Ibid.

10. G.B., Vol. VI, loc. cit.

11. Ibid., Vol. VII, loc. cit.

12. Ibid., Vol. VII, No. 110, W. Lewis, 8th July, 1763; for William Lewis see *Dictionary of National Biography*.

13. G.B., No. 111, S. More. n.d.

14. Ibid., Vol. VI, No. 49, C. Carter, 30th May, 1761; for Ambrose Godfrey see *D.N.B.*

15. G.B., Vol. VII, No. 15. C. Dick, 22nd June, 1762.

16. Ibid., No. 16. C. Dick (enclosure with letter of 22nd June, 1762).

17. R.S.A., Society Minutes, 20th Oct., 1762; quoted D. Hudson and K. W. Luckhurst, op. cit., p. 154.

18. University of Virginia Library, Sabine Hall Papers. Charles Carter, Sr., to Landon Carter, Cleve, 3rd June, 1763.

19. Wentworth-Woodhouse Muniments, loc. cit.

20. *The Virginia Gazette* (Purdie and Dixon), 19th Nov., 1772, p. 2, 11th Nov., 1773, p. 2.

21. Meyer Jacobstein, *The Tobacco Industry in the United States* (Studies in History, Economics and Public Law of Columbia University, XXVI, New York, 1907), p. 28.

* The author is Professor of History at Mary Washington College, University of Virginia.

OBITUARY

We record with regret the death of two Fellows of the Society:

MR. WALTER DORWIN TEAGUE

Mr. Walter Dorwin Teague, Hon.R.D.I., died in New York on 5th December, aged 77. He had been a Fellow of the Society since 1948.

Sir Gordon Russell, a Past Master of the Faculty of R.D.I., writes:

Those like myself who were privileged to know Walter Dorwin Teague in his later years when he was well-established as one of the best known American designers will not be likely to forget him, for several reasons. Although, by his own exertions, he had climbed to the top of the tree and built up a large office it seemed never to have been at others' expense. He had no trace of the tycoon about him; he was affectionate, modest and passionately interested in all that was going on around him.

His family was of Irish extraction and he was the son of a minister in a small village, Decatur, in Indiana, where he was born in 1883. He told me that although the family was very short of cash he recalled with pleasure his childhood in the open spaces where he knew and was known by everyone in the village and the isolated farms around, and how isolated they must have been then! And I think his parentage and upbringing were even more important to him than to most children. In the middle of New York he gave one the impression that he was at heart a countryman and no one who met him could doubt his sincerity.

From the High School at Pendleton (Ind.) he went for four years to the Art Students League in New York. His natural aptitude led him into book illustrating and then advertising. I have no doubt it was a pretty tough assignment but I cannot imagine he made a moan. In 1926 he set up as an industrial design consultant to Eastman Kodak and Boeing Airplane. He was fortunate in being established before the Wall Street crash of 1929, which greatly stimulated interest in industrial design. His practice grew rapidly among internationally known firms such as Edison, National Cash Register, U.S. Steel, Du Pont, etc. I remember well seeing about four years ago in an East Side warehouse in New York his amazing mock-up for the Boeing 707—interior only—full size and complete in every detail, even running water! It cost around half a million dollars to build. He certainly was a thorough person! His design for the 1931 Cadillac brought order into a branch of production which had grown so rapidly that a pause for reconsideration of the total effect was not easy to achieve. Unfortunately the standard he set was not maintained. Quite naturally, his practice soon extended into display design, but not all of his exhibition buildings reached the high standard of most of his industrial design. In 1940 he published *Design This Day*, which was issued in 1946 over here by The Studio. In it he gives much sound advice resulting from his wide experience in a new profession.

It was most natural and fitting that he should have been chosen by his colleagues as the first President of the Society of Industrial Designers and it was with the greatest pleasure that we welcomed him as an Hon.R.D.I. in 1951. Last year he delivered a paper on industrial design trends in the U.S.A. to the Royal Society of Arts. On that occasion he was accompanied by his charming wife, to whom we all extend sincere sympathy.

MRS. E. M. GRIBBLE

Mrs. Eleanor M. Gribble, who died on 22nd November, aged 77, was a gifted artist who worked chiefly in water-colour and pastel. She was particularly well known in Ipswich and its neighbourhood; a native of the city, she lived there for most of her life and was for a number of years secretary of the Ipswich Art Club. As a girl she studied at the Ipswich Art School (where she won the King's Prize for

England, for design) and the Royal College of Art, and was subsequently employed as chief designer in the art department of a local firm of interior decorators. In later life, Mrs. Gribble won a deservedly high reputation for her pastel portraits, but she will also be remembered for several notable works in East Anglian churches: for example, the war memorial reredos in the Lady Chapel at Stowmarket church, and the altar furniture designed for St. Mary at the Elm, Ipswich.

Mrs. Gribble had been a Fellow of the Society since 1936.

CORRESPONDENCE

SHIP MODEL TESTING IN BRITAIN

From *Dr. F. H. Todd, Superintendent, Ship Division, National Physical Laboratory, Faggs Road, Feltham, Middlesex*

We recently had a letter from Dr. Martin of the Royal Society asking some questions about the first recorded account of ship model testing in this country.

The information contained in the minutes of the Royal Society of Arts of 27th July, 1761, is extremely interesting to us, and the picture shown on the Society's Christmas Card indicates that the dynamometers used for measuring the resistance of these models were, in essence, much the same as the gravity dynamometers used to-day in some of the smaller towing tanks. The fact that tests were run both in smooth water and in rough water also indicates that there is really nothing new under the sun.

So far as I am aware, the earliest known proposal for the use of towed models for the investigation of ship resistance was a suggestion by Swedenborg in Sweden in 1721. Between 1750 and 1760, Chapman is believed to have carried out some experiments, also in Sweden. The earliest reference which I have been able to find relating to model experiments carried out in Great Britain is in a supplement to *Shipbuilding and Navigation*, written or published by Murray in 1756. This refers to experiments on ship models in a small tank some 30 ft. long which were carried out by Bird in 1756. He towed his models by a string passing over a pulley and no direct measurements of resistance were made, the merits of any new form being measured by comparison with a standard model.

Following a visit to Holland, Benjamin Franklin on his return to the United States carried out model tests in 1764 to verify observations he had made in Holland to the effect that resistance to motion increases in shallow water. In 1775 a towing basin was built in France, some 106 ft. long, some 56 ft. wide and 6.9 ft. maximum depth. The models were towed by a falling weight and the speed was measured by observation of the times at which the model crossed a number of equally spaced siting lines.

NOTES ON BOOKS

EXHIBITION AND DISPLAY. *By James Gardner and Caroline Heller. London, Batsford, 1960. 84s net*

A number of well produced books have appeared during the last few years dealing with modern exhibitions. Although some of these have tended to stress certain design trends over others according to the tastes of their authors, they have consisted, for the most part, of photographs of good exhibition and display work, with descriptive captions.

In *Exhibition and Display*, James Gardner and Caroline Heller make an entirely different approach to the same subject. They are not primarily concerned with visual aesthetics and do not dwell on the subtle architectural qualities of exhibition structures. They tell us instead what makes exhibitions successful when presented to the public at which they are aimed, and all the possible techniques and devices to achieve this are examined.

These techniques are analysed and discussed always in relation to the fundamental purpose of the exhibition. The authors never lose sight of the end result, even though the field of activity covered ranges through selling goods at trade fairs, displaying treasures in museums or creating national prestige.

After a highly perceptive analysis of the functions of exhibitions and what they can achieve, the book then covers the very many techniques of realizing these ends. The selling of ideas, circulation, lettering, planting—a splendid section on illumination, and countless other matters which make up the extraordinarily complex profession of exhibition design.

After this, examples of exhibitions and display in the widest possible sense are examined in relation to the principles and techniques already dealt with, and the scores of excellent photographs in this section include many revealing ones of exhibition failures, clearly demonstrating pitfalls of design, and in other cases, lack of design.

A technical appendix concluding the book deals with organizational matters concerning exhibitors.

As one has come to expect of books on design and architecture from this publisher, this volume is handsomely produced and laid out and very fully illustrated with excellent photographs and many diagrams.

It is a valuable thing when a successful practitioner and a true authority in a creative field is able to make his experience available to others with the degree of clarity achieved in this work.

ROBIN DAY

DECORATIVE ART, 1960-61. *Edited by Terence Davis. London, The Studio,* 1960. 45*s net*

1960 has been a great year for Birthday celebrations, centenaries and bicentenaries of one kind and another. It is therefore very appropriate that Studio Books too should come forward with their anniversary number of Fifty Years of Decorative Art.

The book is divided into six sections, ranging from architectural interiors to textiles, tableware, ceramics, metal and glassware. The introduction, which is in four European languages, skims very briefly over the remarkable changes which have taken place in the sixty odd years since William Morris died. From the Gimson chair to a fibre-glass shell, this is the Revolution.

Explanatory notes throughout have been kept very brief, emphasis being concentrated on the visual pattern of our 1960 Society. The choice is international, but one cannot help but comment on the similarities of each, so that whether one is studying the house in Hampstead, the apartment in Paris, New Zealand or Japan, one feels each could be labelled 'Home in the World (West) 1960', or 'Home in the World (East) 1960'. Assuming this to be desirable, one can only hope it is prophetic of a racially integrated future.

Comparing further the similarities of open plan and structure, hanging shelves and suspended cupboards, room dividers or combination tables, racks and seating, one gets a curious feeling of rigidity and planned austerity, which one knows to be untrue, for this can only be achieved at much expense. This is revealed in the occasional colour plate where rare veneers, gleam of glass and metal, textured wall-papers and strong colours in upholstery and carpet create the greater luxury one knows to be hidden by the formal black and white of the photographs. This luxury is of course intensified by the acres of fabric used to cover the window walls.

The fabric section is disappointing. Clever photographs of folded hangings and transparent textures do not conceal some very unimaginative designs. The notes do something to help the visual effects, particularly where colour and texture are not seen, but the designs which come off best seem to be the more elegant flower prints. Modern abstract 'amoebic' or tachiste designs lose a lot without colour, but one

encouraging sign is the great freedom of texture which is the result of the spread of screen printing techniques instead of the more rigid copper roller of yore.

One notable change, as remarkable as the revolution in chair design, is the introduction of patterned bed linen, an American contribution. One equally notable omission is unfortunate—the really good Irish linen teacloths which have taken the United Kingdom by storm these last three years or more.

In table and kitchen ware Sweden still seems to lead, in chairs perhaps Denmark, with a backhand compliment to the unknown designer of the circular basket on metal legs. The influence of these Eastern imports with Buddhist names, combined, as it were, with the properties of moulded fibre glass, have had an extraordinary effect on chair design; note for instance, the winged design from Laverne, Inc., U.S.A., which seems about to take off. Splendid—but neither warm nor comforting, characteristics notably lacking in many modern styles.

Spray techniques, too, like the chrysaline pendant, have invaded lighting, which has a strongly oriental feeling, the Chinese lantern being the classic form it is difficult to evade. Lighting, however, has its functionalists, and owes much to the engineer.

As for modern table glass, surely it deserves the finest poetry. Both in style and in price it is 'out of this world', and a gift to editors of books on design.

By contrast how of the earth, earthy, is the section on ceramic art. Whether from Finland, Denmark or Japan, the forms are heavy and so ostentatiously made of clay that it is astonishing to realize it was once the aim of a potter to achieve the refinement and perfection of Dresden china.

But since this book is about the 'Home of all the World 1960', what more suitable finale than the Rocket Group, made poetically enough of 'yellow translucent glass fused in a crystal body'? While it remains only a decorative reminder of the threat which can destroy the 'Home of all the World', let us admire it and the Italians whose contribution it is.

SYLVIA POLLAK

DECORATION AND FURNISHING. *By John Wilson. London, Batsford,* 1960. 63*s net*

It was with interest that I greeted a book on interior decoration that wasn't written like a woman's magazine feature. Too few people realize that this is a serious subject, and not merely a matter of fashion. On the other hand, those that do appreciate this point seem to overlook the fact that it is also a form of art. Mr. John Wilson has presented us with a work entitled *Decoration and Furnishing*, and his sub-title, 'Materials and Practice', is a little truer to the content. Essentially it contains knowledge which should be, but at the present moment is not, familiar to every interior designer or decorator. It is in fact a textbook on the materials used in the decoration of any building, domestic or otherwise, and the method of application. As such it is comprehensive and informative; indeed I suggest it might well become an essential standard work for any student.

However, Mr. Wilson presents decorating in its lowest common denominator—as a craft rather than an art. His chapters are packed with technical data; here is the answer to why an Axminster carpet differs from a Wilton, or how to anodise aluminium—good, solid nose-to-the-grindstone stuff without an ounce of inspiration, too closely resembling the art of interior decoration in this country to-day.

Furniture is dismissed a little too easily with a few details on construction and a somewhat incomplete chart of measurements: I found no mention at all of office furniture. Most of the lists supplied, and the information given, are reliable in themselves, though in the instances where the author has ventured into the 'flossier' end of the trade the results are not so satisfactory. Figure 63 gives four good examples of badly proportioned curtains.

I do not wish to be unfair: this is in itself an excellent student designer's textbook,

or master decorator's handbook, and I have no doubt that this is what Mr. Wilson intended. However, in view of the fact that though basic it may be, it is still called *Decoration and Furnishing*, I think that a more inspired approach would have resulted in something a little more palatable. (The dust-cover in itself is likely to damn the book. A more sickly combination of colours and matter I have rarely seen, and the result is one of the most unattractive jackets one could imagine for a book of decoration.)

MICHAEL INCHBALD

INTERNATIONAL POSTER ANNUAL. *Edited by Arthur Niggli. London, Tiranti*, 1960. *£3 net*

The ninth edition of this work contains 116 pages of illustrations and an introduction by the editor, who has selected examples from 25 countries. There are 483 black and white reproductions of posters and 19 in colour. Had the book been laid out less wastefully larger reproductions would have been possible or, alternatively, more designs could have been included. As it is, many of the pages suggest a stamp album, dotted with small half-tone blocks.

In the introduction (which has four misprints) the editor suggests that an 'international style' is apparent, which makes it difficult to assign examples to different countries, 'unless the lettering gives a clue to its national origin'. This elderly belief in an 'international style' is a fallacy often based on political wishful thinking. It was a modish tag attached to the modern movement in architecture 25 years ago and is quite inapplicable to the posters collected for this work.

The English captions to the illustrations are occasionally obscure. No. 160, presumably advertising some kind of table ware, merely has the world 'vessel'; 220, an anti-litter poster, shows somebody dropping a banana skin and reads 'Don't spread slopes.' Presumably this means slides. 274, a Japanese poster, advertises a 'swimming feast', whatever that is.

Outstanding among the European examples are No. 25, from Austria, a remedy for hayfever by Erich Buchegger; the circus posters by Erik Stockmarr of Denmark, 40 to 42; and one for an encyclopaedia, 60, by Alfons Eder of Finland. With a few exceptions the English contributions are disappointing. The Patrick Tilley poster for Ferguson's television and radio sets, 78, is reduced to a scale far too small to do justice to the design. The British Transport Commission posters, 96 to 111 inclusive, are among the best in the book, particularly those by Harry Stevens and Daphne Padden. There are some vivid and whimsical French designs which, like those from Italy, Czechoslovakia and Poland, make nonsense of the suggestion that an 'international style' is obliterating national characteristics. The United States is badly represented, and the highlights of the collection come from Italy, Czechoslovakia, Nigeria, Israel and Japan.

Far too many exhibition posters have been included. At the conclusion of the introduction the editor says: 'It seems that a particularly large number of talented young graphic artists has been trained in Japan and that they are helping to bring Japanese advertising art to a high standard.' Perfectly true. The virility of imagination apparent in the twelve pages of work by Japanese artists makes even some of the most accomplished European work look a trifle pallid and old-fashioned. The poster for peace by Jun Tabohashi, 295, is unforgettable.

Had this work been published in the 1930s, many of the examples from Central Europe would have seemed like a revelation of aggressive modernity, but not now. To-day the real, revolutionary ideas seem to be coming from the Near East, the Far East, and Africa.

JOHN GLOAG

FROM THE JOURNAL OF 1861

VOLUME IX

EXTRACTS FROM THE REPORTS OF H.B.M. CONSULS

4th January

SUGAR FROM SIAM.—Siamese sugar may be imported into the United Kingdom as free grown. It is much esteemed for its whiteness and fine strong grain, and as the greater portion of the valley of the Menam, the area of which has been estimated at 22,000 square miles, is reported to be well adapted to the growth of the cane, it would appear that the cultivation, unless checked by indolence on the part of the people, or illiberality in the measures of Government, would readily admit of a very material increase.

RAW SUGAR FROM BEETROOT, manufactured at Dunkirk, is imported into England, where, after being refined, it can be sold for 5½*d.* per lb.; if refined at Dunkirk, and sold there, the same sugar costs 8*d.* per lb.

LATAKIA TOBACCO.—The best exported from Latakia is that produced in the district of Gebel. When this has been hung up in the rooms of the peasants, and there allowed to absorb the smoke of the dwarf oak, it gives a delicious perfume in smoking. It is then called Abu Richa (Father of Scent). It is worthy of observation that the Abu Richa improves a great deal after having been some days on board ship. In Egypt it is in great demand. The peculiar property which this tobacco derives from being exposed to the smoke was accidentally discovered as follows: one year there being no demand for tobacco, the leaves were hung up for the winter in the peasants' huts, exposed to the continual smoke of their fires, and the succeeding year it was sent to Egypt, where it was considered so good that a large order was sent to Latakia for more of the same quality, which was then called Abu Richa.

11th January

TRADE GUILDS.—In Frankfort the privileges enjoyed by the several guilds stand most materially in the way of the otherwise increasing prosperity of the town. A citizen who takes up his freedom for a particular trade or profession must confine himself exclusively to that particular trade, and cannot combine any other trade with it. For this reason, no manufacturer of carriages, or railway carriages for example, can exist there, because the tradesman, supposing him to be a saddler, must employ a blacksmith for the iron and a wheelwright for the wooden material of his carriages.

ANCIENT VASES AND GOLD ORNAMENTS are often picked up by the inhabitants of the Island of Astropalia or Stampalia, in the Ottoman Archipelago. It is a singular fact that no serpents or reptiles exist on the island, and although they are sometimes found among the firewood which is imported, they do not live.

THE MINERAL PRODUCTS of the island of Cyprus have hitherto been unexplored. It is, however, certain that many mines would be discovered of sulphur, coal, copper, iron, and perhaps also gold and silver. Romance speaks much of treasures concealed in the isle of Cyprus. The island possesses two rich natural salt pits, one of which is situated half a league from Larnicu, and the other a third of a league from Limasol. There are also coloured earths, trees, and roots, adapted for dyeing, and medicinal plants; pot herbs grow wild in the fields and prairies, while on the hills exist rich

pastures which would feed numerous flocks. The island produces wool, cotton, alizaris (madder) silk, flax, sesame, tobacco, colocynth, oil, wine, figs, currants, oranges, honey, pitch, skins of sheep and hares, yellow, red, and green umber, butter and cheese. There is not a single bank in all the island; the want of an establishment of the kind is sensibly felt. The present state of Cyprus is that of a country which once was celebrated, rich and populous, which now is but the shadow of its former days, but for which a better destiny may be reserved.

Some Activities of Other Societies and Organizations

MEETINGS

FRI. 30 DEC. Zoological Society, Regent's Park, N.W.1. 3 p.m. The Earl of Cranbrook : *Bats.* (Lecture for children.)

TUES. 3 JAN. Reinforced Concrete Association, at Birmingham and Midland Institute, Paradise Street, Birmingham. 6 p.m. C. A. C. Davies : *Reinforced concrete construction in the coal industry.*

Royal Commonwealth Society, Northumberland Avenue, W.C.2. 6.30 p.m. Charlie Martineau and Christopher Taylor : *Boys in the Blue Mountains—and in the Jungle.* (Children especially invited.)

WED. 4 JAN. Newcomen Society, at Science Museum, S.W.7. 5.30 p.m. Dr. Harold B. Hancock and Dr. Norman B. Wilkinson : *Joshua Gilpin, an American manufacturer in England and Wales.*

Radio Engineers, British Institution of, at London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1. 6.30 p.m. W. E. Brunt : *Automatic techniques in civil air line communications systems.*

THURS. 5 JAN. Electrical Engineers, Institution of, Savoy Place, W.C.2. 5.30 p.m. Dr. J. S. Forrest : *The application of electronics to the electricity supply industry.*

Royal Commonwealth Society, Northumberland Avenue, W.C.2. 1.15 p.m. Sir James Robertson : *Sovereign Nigeria.*

MON. 9 JAN. Electrical Engineers, Institution of, Savoy Place, W.C.2. 5.30 p.m. Dr. G. H. Metson : *Recent research in thermionics.*

Reinforced Concrete Association, at College of Technology, Sackville Street, Manchester. 6.45 p.m. D. Bishop : *The selection of plant and its consequences in reinforced concrete construction.* (The same paper will be delivered at a meeting to be held at the Liverpool Engineering Society, Dale Street, Liverpool, at 6.30 p.m. on 10th Jan.)

Transport, Institute of, at Institute of Marine Engineers, Mark Lane, E.C.3. 5.30 p.m. H. C. Johnson : *Organization.*

TUES. 10 JAN. Civil Engineers, Institution of, Great George Street, S.W.1. 5.30 p.m. J. M. Kesson : *The loading of light railway tracks.*

Plant Engineers, Institution of, at Royal Society of Arts. 7 p.m. H. Hewitt : *Recent developments in lighting.*

WED. 11 JAN. Mechanical Engineers, Institution of, 1 Birdcage Walk, S.W.1. 6 p.m. A. E. Powell and E. Forth : *The design, commissioning and operation of Blyth 'A' power station.*

Radio Engineers, British Institution of, at London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1. 7.15 p.m. Dr. G. F. Taylor : *Multi-layer switching devices.*

THURS. 12 JAN. Royal Commonwealth Society, Northumberland Avenue, W.C.2. 1.15 p.m. Miss Mary Trevelyan : *From the ends of the earth.*

TUES. 17 JAN. Civil Engineers, Institution of, Great George Street, S.W.1. 5.30 p.m. S. G. Wardley : *A civil engineer and town planning.*

Locomotive Engineers, Institution of, at 1 Birdcage Walk, S.W.1. 5.30 p.m. G. M. Barrett : *Spectrographic analysis of crankcase lubricating oils as a guide to preventive maintenance of locomotive diesel engines,* and S. Bairstow : *Control of quality of crankcase lubricating oils of locomotive diesel engines in service.*

Physics, Institute of, and Physical Society, at Royal Horticultural Society's Old and New Halls, S.W.1. 5.45 p.m. F. S. Burt : *Hydrodynamic research.*

WED. 18 JAN. Physics, Institute of, and Physical Society, at Royal Horticultural Society's Old and New Halls, S.W.1. 5.45 p.m. Dr. G. E. R. Deacon : *The physics of the ocean.*

Reinforced Concrete Association, at 11 Upper Belgrave Street, S.W.1. 6 p.m. J. Munro and A. Edwards : *Structural analysis and digital computers.*

THURS. 19 JAN. Physics, Institute of, and Physical Society, at Royal Horticultural Society's Old and New Halls, S.W.1. 5.45 p.m. Dr. F. P. Bowden : *Some physical problems in travelling at supersonic speed.*

Radio Engineers, British Institution of, at London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1. 6.30 p.m. Symposium : *Alpha numeric displays.*

Royal Commonwealth Society, Northumberland Avenue, W.C.2. 1.15 p.m. Rt. Honble. Edward Heath : *The Commonwealth and Europe.*

FRI. 20 JAN. Electrical Engineers, Institution of, Savoy Place, W.C.2. 5.30 p.m. Discussion : *Management studies for junior engineers.*

TUES. 24 JAN. Civil Engineers, Institution of, Great George Street, S.W.1. 5.30 p.m. F. Fancutt and J. C. Hudson : *The choice of protective schemes for structural steelwork.*

WED. 25 JAN. Mechanical Engineers, Institution of, 1 Birdcage Walk, S.W.1. 6 p.m. Professor W. R. Hawthorne : *The early development of the Dracone flexible barge.*

Radio Engineers, British Institution of, at London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1. 6.30 p.m. K. R. McLachlan : *Noise correlation measurements.*

OTHER ACTIVITIES

MON. 2 JAN. (Week commencing.) Commonwealth Institute, South Kensington, S.W.7. *Films : Challenge of progress—Ghana, Operation Khedda—India* and *Land of the Buddha—Ceylon.*

MON. 9 JAN. (Week commencing.) Commonwealth Institute, South Kensington, S.W.7. *Films : A stake in the land—Rhodesia, Boogie doodle—Canada* and *Four ways to Milford—New Zealand.*

MON. 23 JAN. Manchester Building Centre, 115 Portland Street, Manchester 1. 1 p.m. *Film : New light in industry.*

MON. 23 JAN. (Week commencing.) Commonwealth Institute, South Kensington, S.W.7. *Films : Bombay—gateway to India* and *Wild Splendour—Kenya.*

STANDING COMMITTEES

It is regretted that the list of Members of the Industrial Art Bursaries Board published on page 67 of the December *Journal* was incomplete. The full list is as follows:

Sir Ernest Goodale, C.B.E., M.C., Hon.F.S.I.A., Comp.T.I. (*Chairman*)
Mrs. Mary Adams, O.B.E., M.Sc.
D. W. Barrett, C.B.E., F.B.H.I.
J. I. Bernard, M.I.E.E.
Lord Bossom, LL.D., F.R.I.B.A., J.P.
Cyril Carter
The Honble. G. C. H. Chubb, M.A.
Lord Conesford, Q.C.
R. E. Dangerfield
Geoffrey De Freitas, M.A., M.P.
E. M. O'R. Dickey, C.B.E., Hon.A.R.C.A.
F. H. Dowden, H.M.I.
C. H. Edwards, F.B.S.I., A.M.B.I.M.
E. A. Entwisle
Peter A. Le Neve Foster
Miss M. France
E. Maxwell Fry, C.B.E., B.Arch., F.R.I.B.A.
John Gloag, Hon.A.R.I.B.A., Hon.F.S.I.A.
Professor R. Y. Goodden, C.B.E., R.D.I., A.R.I.B.A., F.S.I.A.
Milner Gray, R.D.I., PP.S.I.A.
J. Douglas Hood, C.B.E., J.P.
William Johnstone, O.B.E., D.A.
J. C. Jones, C.B.E., B.Sc., M.I.Mech.E., A.M.I.C.E.
H. P. Juda, O.B.E., Hon.A.R.C.A., Hon.F.S.I.A.
Lord Latham, J.P., F.A.C.C.A., F.C.I.S.
Edgar E. Lawley
J. H. Mellor, M.S.I.A.
F. A. Mercer, Hon.F.S.I.A.
O. P. Milne, F.R.I.B.A., J.P.
Lord Nathan, P.C., T.D., F.B.A., D.L., J.P.
F. O. R. Plaistow
H. V. Potter, B.Sc., F.R.I.C., M.I.Chem.E., F.P.I.
J. C. Pritchard, O.B.E., M.A.
Ernest Race, R.D.I., PP.S.I.A.
A. B. Read, R.D.I., F.S.I.A.
Paul Reilly, M.A., Hon.F.S.I.A.
A. R. N. Roberts
Sir Gordon Russell, C.B.E., M.C., R.D.I., Hon.A.R.I.B.A., F.S.I.A.
Professor R. D. Russell, R.D.I., F.S.I.A.
H. V. Shelton
Elkan Simons, F.I.C.D.
Sir Raymond Streat, K.B.E., Hon.F.S.I.A.
G. E. Tonge, C.B.E.
Hugh A. Warren, M.Sc.(Eng.), M.I.C.E., M.I.Struct.E.
J. W. Waterer, R.D.I., F.S.A., N.R.D., F.S.I.A.
Sir Harold Wernher, Bt., G.C.V.O., T.D., D.L.
Sir Griffith Williams, K.B.E., C.B.
Miss Anna Zinkeisen, R.O.I., R.D.I.